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NEWS IN BRIEF

Bell CRT Terminal Planned for Next Year

NEW ORLEANS – AT&T will introduce an alphanumeric CRT terminal sometime next year. The unit, which will be introduced as the Dataspeed 40 service, is now undergoing final product trials, according to AT&T Vice-President Theodore Simis, who announced the keyboard terminal at the annual Digitronics Users Association meeting last week.

Details of the terminal, published in a recent AT&T management newsletter, indicate it will include a "high-speed impact printer and initial models will transmit data at 1,050 word/min. The CRT is reported to have a top speed of "over 3,000 word/min."

Data can be displayed on the screen as it is entered by the operator and hard copies can be produced either before or during transmission, according to the newsletter.

Field trials of the device were conducted at General Mills and Goodyear and the machine was developed for AT&T by Teletype Corp.

Nov. 1 Is Deadline for Filing Applications for CDP Exam

PARK RIDGE, Ill. – The deadline for filing applications to take the examination for the Certificate in Data Processing (CDP) is next Wednesday, Nov. 1.

The exam, administered by the Data Processing Management Association, will be given in regional testing centers Feb. 17, 1973. Applications and other information are available from DPMA's Certification and Testing Section, P.O. Box 195, 60068.

On the Inside This Week

Charging for VS Use May Pose Problem — *Page 13*

Model 125 Doesn't Fit Into the 370 Line — *Page 16*

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U.S. Files Breakup Plan

Users to Be Protected if IBM Split

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK – The Justice Department stated last week that it tentatively favors breaking up IBM into separate operating companies, each of which would be able to offer users a complete line of computers, peripheral equipment, software, maintenance and other services.

At the same time, the move would contain safeguards to ensure that present IBM computer users would continue to receive a high level of support during the transition to the multiple-company concept, the Justice Department said.

At the most significant hearing to date in the almost four-year-old antitrust suit between the U.S. and IBM, IBM reacted to the government proposal by calling for a trial within 30 days on certain portions of the case.

The move for an early trial on certain segments of the case, however, is expected to be opposed by the Justice Department at the next hearing, Oct. 30, and most sources close to the case indicated that a trial on the entire case is still years in the future.

Full text of Justice memorandum on page 6; other stories on page 2.

Justice View on Breakup

While the Justice Department, in its "Preliminary Memorandum on Relief," noted that "substantial discovery and evidentiary hearings" are still needed before it can outline its specific ideas for ending the case, it said divestiture "is the normal, natural and appropriate form of relief in monopolization cases under Section 2 of the Sherman Act."

Further analysis of the "incomplete and sometimes equivocal factual record," however, "may demonstrate that other forms of divestiture, or divestiture coupled with injunctive relief, may be sufficient to remedy the effects of the alleged monopolization," Justice added.

Specifically the department is presently asking for "divestiture relief designed to dissipate the enormous market power of the current IBM computer manufacturing and marketing structure by the formation of the total domestic and international computer systems facilities of IBM (manufacturing, marketing, research and development, capital, patents and know-how) into several discrete, separate, independent and competitively balanced entities capable of competing successfully in domestic and international markets with one another and with other domestic and foreign competitors."

This would mean the establishment of a number of "mini-IBMs," each capable of offering the services and products provided by the present company, but on a much smaller scale.

Other divestiture proposals have been made in other cases such as the one filed by Control Data Corp. against IBM which would require divestiture along functional lines; i.e., a separate central processor company, a separate software house, a separate peripherals company and so forth.

Reportedly, the Justice Department rejected this approach because it was felt

(Continued on Page 3)

TWA, Vendor Settle Suit, User Wins Record Award

By a CW Staff Writer

NEW YORK – The largest of all the computer user lawsuits ended with a record out-of-court settlement, when Trans World Airlines (TWA) and Burroughs Corp. gave up the fight last week.

TWA had sought $70 million in damages, more than any other user had sought from his supplier.

Neither side was claiming victory, and there was little discussion about the settlement.

It is known, however, that TWA will not have to pay the remaining $11.5 million of its $38 million contract, and that it will have free access for the next ten years to Burroughs computers worth some $14 million.

Additionally, Burroughs has agreed to buy some $2 million worth of software developed by TWA, including both reservation systems and control software, according to an airline official.

When the airline filed the breach-of-contract suit two years ago, it sought $70 million in damages, but the chief area of contention, it was then believed, was applications software. Observers expressed surprise that the Burroughs agreement included control software; officials of the Detroit-based computer maker were unavailable for comment.

The original contract was signed almost seven years ago, and was amended several times until June, 1968, when delivery of the massive B8300 systems began.

The reservation and management information system was never fully operational, TWA contended.

The B8300 was never in the full product range, Burroughs said last week. The machine was a successor to the B8500 and was withdrawn after being announced, the company added.

Burroughs confirmed the details of the settlement.

The original lawsuit charged the system was "unreliable, incomplete and defective with resulting breakdowns and failures," and "in all respects" was "totally unfit for TWA's purposes."

Burroughs responded that TWA had failed to give written notice and an explation of circumstances "concerning any claim that any item fails to conform to warranty." The airline, Burroughs continued, also neglected to give 30 days' notice of cancellation.

Burroughs further contended that TWA accepted the system after testing it, and

(Continued on Page 4)

Cassette Subsystem Is Basis Of Burroughs 'Virtual' Minis

By Michael Weinstein
Of the CW Staff

DETROIT – Burroughs has introduced a new series of minicomputers featuring "virtual memory" capabilities.

The basis of the "virtual memory" capabilities is a cassette subsystem and a "dynamic overlay" facility within the central processor.

Programs requiring more memory than available real memory are loaded and processed in segments from the cassettes.

One mini system can have up to four cassette tape substations for data and program input and output.

A new peripheral offered with the L8000 Series is an automatic record handler which feeds magnetic cards into a forms handler for updating, and restacks them into their original order.

Users can refer to the magnetic cards visually, use them as input for updating records or process them to create differing reports and formats of output information.

Other peripherals include a magnetic tape unit, line printer – 90 or 180 line/min, 96-column card reader, paper tape and edge punch card equipment and the on-line mag-record reader used with the magnetic record handler.

The four models in the Series L8000 come complete with a software library of application programs, which, Burroughs claimed, markedly reduce the user's costs for program development.

Examples of application programs are report generators, simulation packages and forecasting programs.

All models within the L8000 Series utilize semiconductor memory ranging from 4K to 48K bytes of real memory. Memory cycle time is 1.5 μsec and memory instruction time is 3 μsec.

Sale prices for basic L8200, L8300 and L8400 models range from $12,990 to $15,690 with leasing prices from $355 to

(Continued on Page 4)

★Special Report: Getting Out the Output★ Follows Page 20

Judge to Rule Oct. 30 on IBM Bid for Separate Trials

- *Issue of Market Definition Vital*
- *Justice Opposes Use of Census Data*
- *Judge Disappointed With Slow Pace*

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK – In order to speed up the antitrust suit between the U.S. Government and IBM, IBM last week proposed splitting the case into several parts and called for a trial on the first part within 30 days.

The first trial would be solely on the issue of market definition; i.e., how large is the computer market and what is IBM's share in that market, under the IBM proposal.

The court has scheduled a hearing on the motion for Oct. 30 and if granted, the trial could start before Dec. 1.

Justice Department attorneys, however, opposed the motion quickly and stated that they felt the case could not be resolved by "hacking off" pieces for separate trials.

Market Definition

The issue of market definition is central to the U.S. vs. IBM case, as it is to all of the antitrust actions presently facing the firm, including those brought by Control Data Corp. and Telex which are being heard by a Federal District Court in Minneapolis.

IBM has contended in all of the cases that the computer market should be defined as all firms in the business, including software houses, independent peripherals firms, time-sharing companies and banks and other businesses that market some time on their computer systems, as well as the central processor manufacturers.

All the other parties involved in disputes with IBM have taken a different view of the market, preferring to define it just as the manufacturers of central processors or the manufacturers of complete computer systems.

If one accepts the IBM view of the computer market, the firm contends it has a share of around 30% to 40% of the total computer revenues, but if one accepts the other definition of the relevant marketplace, then the IBM share rises to between 60% and 70%, according to most reliable estimates.

Move Unique

According to an affidavit supporting its motion, the "defendant's request for an immediate trial is probably unique in major antitrust litigation," a statement backed up by several antitrust lawyers who noted that a defendant rarely asks for a trial in an antitrust case.

"Defendant asks this court," the affidavit by Thomas Barr, IBM's trial attorney, continued, "to accord it the fundamental right to protect its good name and reputation and to vindicate its business conduct against an unnecessarily prolonged, dilatory and misinformed prosecution by the Federal Government.

"For almost six years plaintiff has refused to discuss the possibility of settling the matter. For almost four years plaintiff has failed and refused to bring this case to trial," he charged.

"For all this time, plaintiff has repeatedly taken the position that, despite elaborate discovery, it was not sure of the facts and circumstances underlying the complaint. The day before the complaint was filed the attorney general of the U.S. conceded the government might well not then have sufficient or complete information with respect to the industry," he added.

Barr said IBM felt it was completely innocent of the charges outlined by the government and noted it "has vindicated that position five times within the last three years in five separate federal courts."

Because of this, he said IBM "pleads with this court, as a matter of fundamental right and justice, to be accorded immediately the only remedy the government's conduct leaves – the right to vindicate its position on the merits."

Barr noted that "a full trial of this case would take many months, if not a full year, and would require probably two or more additional years of discovery," but added that "fortunately, if one precondition can be met and the court could possibly make itself available, a virtually immediate trial could be had on the threshold issue of market definition.

'Day in Court'

"We, therefore, respectfully demand the right to a day in court," Barr stated, "to require the government to come forward and give proof of the claims which it makes, and to demonstrate that those claims are without a shadow of supporting evidence."

But in order to proceed with the trial, the IBM affidavit requests the court to admit into evidence the statistics developed from a census of computer companies taken in the IBM-Control Data suit in Minneapolis.

These statistics were gathered by the court by questioning around 2,000 firms in the data processing business on the scope of their involvement in the industry.

The census was taken under the jurisdiction of the U.S. District Court for the District of Minnesota and contained questions supplied by IBM, Control Data and Greyhound Computer which was at the time suing IBM.

The Justice Department lawyers responded by asking the judge to bar the use of the statistics from the census, since the Justice Department was not a party to it when originally taken.

The use of the census data is considered crucial to the IBM case, because it purportedly shows that IBM's share of computer revenues has dropped from around 68.4% in 1952 to 38.1% in 1970.

During the same time, an analysis of the census figures shows the number of firms in the industry has risen from 11 in 1952 to 1,757 in 1970, according to IBM.

The move for a separate trial fell on somewhat receptive ears, in that Judge David Edelstein, who is hearing the case, said several times at last week's hearing that he was disappointed with the progress being made in the case and urged the parties to quicken the pace of the action.

But at the same time, Edelstein indicated he might not accept the census data taken in another court if the Justice Department lawyers opposed the move.

He asked Barr if IBM would go on with the separate trial even without the census data and Barr replied affirmatively, but indicated IBM would manage to get an entirely new census taken during the 30-day period between the granting of its motion and the start of the trial.

Justice Outlines Issues to Be Resolved

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK – While calling for the breakup of IBM, the Justice Department last week also filed an outline of its case against IBM, stating specifically the areas where it feels there have been antitrust violations.

IBM reacted sharply to this document claiming it opened up new areas in the case instead of narrowing the issues and stating that the move would set back the trial date by several years.

But even though the Justice Department document does contain some specifics not found in its earlier complaint, Justice also noted that further "discovery and discussion will undoubtedly result in the addition of new issues, as well as the dropping or restating of some of the present issues."

The first issue on the Justice Department list concerns the size of the computer market that is applicable to the case and whether or not there are reliable ways of measuring IBM's share of the market.

Another issue will be "whether IBM effected changes in its market measurement policies and practices on or about the time of the filing of the complaint and, if so, whether such changes show or tend to show IBM's knowledge that its prior market measurement policies and practices revealed that it possessed a monopoly share in such markets."

The case, Justice said, would have to determine the best measurement of the market; i.e., dollar value of shipments, unit volume of shipments, revenues or installed inventory or equipment.

Another issue that would be resolved would be "whether the sustained high level of profitability by IBM during a period of substantial growth of the relevant markets, accompanied by an absence of significant entry and the exit of two of the leading industrial enterprises in the U.S., GE and RCA, characterizes the relevant markets as monopolized markets," the Justice statement said.

The case would also have to determine whether there are "substantial barriers to entry by new competitors that contribute . . . to the sustained monopolization by IBM of the relevant markets," and whether there are "substantial barriers to expansion by existing competitors."

Another issue would be "whether IBM has the ability to establish product standards unilaterally, and if so, whether this ability shows or tends to show that IBM possesses monopoly power," the government attorneys said.

In addition, the case will try to show "whether IBM intended to monopolize the relevant markets," and whether such intent is evidenced in part by IBM's marketing practices relating to pricing, leasing, product announcements and product developments, customer or supplier relations and educational allowances."

The trial will have to resolve "whether IBM, in furtherance of its attempt to monopolize . . . engaged in 'bundling,' i.e., marketing a combination of computer products and services for a single price."

Also, the government said the trial would have to determine "whether IBM's employment of a single or bundled price did inhibit the growth of independent competitors in the computer support field. If so, whether such an inhibition prevented, discouraged or forestalled the entry or expansion of other companies engaged in the manufacture and marketing of products in the relevant markets."

Justice also listed several IBM actions which would have to be discussed in the trial to see whether they affected competition in the peripherals marketplace, including:

- "IBM's . . . announcements of changes in its product lines, marketing policies and prices with respect to its peripheral equipment.
- IBM's June 1971, Fixed Term Plan announcement.
- "IBM's August 1971, Extended Term Plan announcement.
- "IBM's technological rebundling in its recent announcements with respect to the memory units, file adapters and selector channels of its 370 series general-purpose digital computer systems."

Another issue involves "fighting machines," or equipment that is introduced into selected markets with relatively low profit expectations in order to restrain competitors from entering or remaining in those markets, Justice said.

The Justice Department also said it would look into the leasing area to see whether IBM manipulated the price-to-lease ratio of equipment in order to make it hard for third-party lessors to compete, and whether IBM discriminated against customers of leasing companies by refusing to support those customers.

In conclusion, Justice also promised a close look at educational discounts to try to determine whether IBM used the discounts for the purpose of "maintaining IBM computer installations at prestige accounts and insuring familiarity among graduates of educational institutions with IBM products."

Thomas Barr, chief IBM trial lawyer, said the "Preliminary Statement of Tentative Triable Issues" adds actions that occurred two years after the case was filed and said if the government wanted to add such actions it would have to amend its complaint.

In addition, he charged the issues of independent peripherals and leasing were not in the original complaint and that in the past the government had tried to keep those issues out of this case.

"The case has exploded," he said.

He charged the additions to the case have put the trial off for several more years and charged the government wanted the delay because it did not have a case.

The Justice Department in 1969, he said, conceded that it did not have all the necessary facts in the case, and now four years later, after millions of documents have been filed and many depositions taken, the government still does not have a case, he noted.

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Justice Assures Users Support In Filing Plan for IBM Breakup

(Continued from Page 1)

such divestiture would establish IBM as the dominant company in each of the submarkets, in effect creating a monopoly condition in the peripherals business and software business with the IBM spinoffs as the dominant companies.

Therefore, sources close to the case said Justice decided the establishment of several companies offering the same services presently offered by IBM would be the best method of restoring competition to the industry.

Although the department did not spell out how many firms should be created out of the present IBM structure, several sources noted that if the firm, which currently controls around 65% of the computer systems business according to most estimates, were broken down into five separate entities, each would control about 13% of the business.

But the Justice Department also put provisions into its proposal for relief to protect present users of IBM equipment.

"The relief . . . should be accompanied by protective provisions designed to insure that the entities resulting from the divestiture continue to provide service effectively to existing users of IBM equipment," Justice said.

"This is to be achieved by injunctive provisions designed to insure all these entities the necessary access to know-how, equipment and parts so that they can provide customers with a broad line of computer equipment, parts, software, maintenance and other services during an appropriate transitional period following divestiture."

The government also asked for injunctive provisions to prohibit IBM from "marketing its computer systems or any part thereof, its software and its support services by the use of bundled prices; pricing any computer system or any part thereof, its software, or its support services at a loss or other predatory levels, or discriminating in price, for the purpose . . . of hindering competition; announcing new computer products or systems prior to the time that such products or systems have reached the point of manufacturing and marketing feasibility."

IBM had feared the new government charges would be sweeping and radical, according to Thomas Barr of the firm of Cravath, Swain and Moore, IBM's outside law firm.

But those fears were largely unfounded, he told the court, since the government complaint was unchanged from the original motion filed by the Justice Department in 1969.

At the same time, Barr said IBM had hoped the government's filing would be specific enough so the case could proceed faster, either to a trial or into negotiation for a consent decree.

But the government response "didn't live up to our hopes," he said.

Barr charged the filing indicated the Justice Department had not understood the facts of the case when it was initially filed, because if it had "it never would have filed the suit."

He contended the government still did not have the facts to support its case and it could not "possibly prove" the case even after it had investigated the matter for six years.

The Program Changes Too Often

By Marvin Smalheiser
CW Correspondent

LOS ANGELES – Data processing snafus for the Los Angeles County Department of Social Services have cost the county at least $10,000 as well as several delays in sending checks to welfare recipients.

Bennett L. Moe, executive director of a commission studying the welfare department, reported that a blank tape was mistakenly used to update the October food stamp payroll.

The result was a cancellation of purchase orders for 260,000 different families and a payroll rerun, which cost $10,000.

Moe also said programming mix-ups delayed delivery of 4,000 checks to welfare recipients.

Also, the delivery of 3,000 checks for welfare recipients was set back several days because of two updatings necessary to provide time to adjust computers for new regulations on unborn children and Social Security increases, Moe said.

The discovery of an April programming error disclosed food stamp authorization requirements were too large for 37,000 welfare recipients.

Moe said the original computer tape was lost and reimbursement of the recipients is being delayed until new computer tapes are made.

A spokesman for the county DP department, which handles data processing for the welfare department, said the error ratio for the welfare department processing has been low in relation to the volume of work.

He cited inadequate time to thoroughly debug program changes resulting from changes mandated by the state and federal governments as one of the reasons for the errors.

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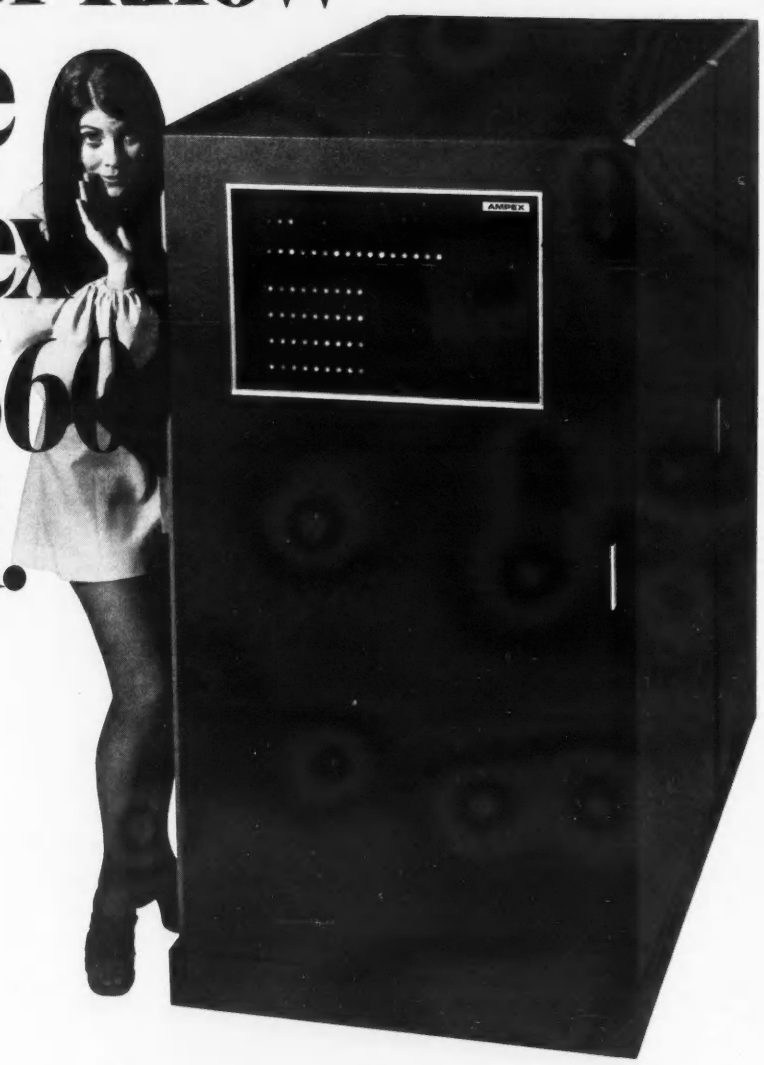

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NAS Warns of Despair in Privacy Invasion Fight

By Edward J. Bride
Of the CW Staff

NEW YORK – The chief danger in today's controversy over computerized data banks is despair, not privacy invasion.

"We may give up the fight in the belief we have already lost," reported the National Academy of Sciences (NAS), in summarizing its project on "Data Banks in a Free Society."

"If we assume that computer users are already doing things that they are not, we risk surrendering without a fight the border between properly limited and surveillance-oriented computer applications," reported the NAS group.

Headed by Prof. Alan Westin of Columbia University, the group is a subcommittee of the NAS Computer Science and Engineering Board, which was formed four years ago to discuss issues of due process and privacy as they might be impacted by computers.

The final 500-page report was written by Westin and Michael A. Baker, sociology instructor at the Brooklyn College of the City University of New York; the report was officially released earlier this month, and is slated for November publication by Quadrangle Books here.

Though the report firmly states the need for data bank controls, it also stresses that the privacy problem is not as bad as many civil libertarians have suggested.

As part of the project, the committee visited 55 organizations with highly-advanced computer applications, and concluded computerization is not yet having such effects as consolidation of confidential personal data or collection of "more detailed and intrusive personal information."

The report predicted an increase in the ease of sharing data among organizations with computers, "coupled with a reduction in the cost of doing so.

"This will make it imperative that legal boundaries as to data-sharing" are set as clearly as possible, the report warned.

The next five years will comprise the moment when lawmakers and the public must confront "both long-standing and newly raised civil liberties issues," and evolve a "new structure of law and policy" for privacy and due process, according to the report.

Six Action Areas

There are six areas of priority for public action, the report suggested, adding each "ought to be seriously considered by policy makers":

- Publication of a "citizen's guide to files," to provide a thorough, detailed and non-technical directory of data banks on individuals, and the "general rules" under which data is being held and used.

The report suggested laws should be developed, giving individuals a right of access and challenge to "almost every file" kept by government agencies, whether city, county, state or federal.

- Development of laws or rules balancing confidentiality and data-sharing in the "many sensitive record systems that today do not have clearly defined rules."

Coming under these rules would be providing data to law-enforcement agencies by banks, travel and entertainment card companies, airlines and hotels, etc.

- Limiting distribution and/or collection of data "where a proper regard for the citizen's right to privacy suggests that records ought not to be maintained at all by certain organizations, or never furnished for certain uses in the society."

Examples would be arrest-only records in licensing and employment decisions.

The report suggested that such usage – and dissemination beyond the law-enforcement community – could represent "an official stigmatization of the citizen that ought to be either forbidden by law, or closely regulated."

Other Approaches

There are other approaches proposed with the final three suggestions introduced with the statement that "computer professionals are fellow citizens, not experts" on the privacy matter:

- Increased work towards technological safeguards must be performed by the computer industry and professionals to "make it possible to implement confidentiality policies more effectively than is now feasible.'

"No 'technological fix' can be applied to the data bank problem," the report claimed, adding protection of privacy is a matter of "social policy," where computer people are lacking in expertise.

- Congress and the Executive Branch must reconsider the current permissiveness towards using the Social Security Number in government and private records; a common numbering system, while not a prerequisite, makes record linkage easier and cheaper, the report noted.

"Adopting the Social Security Number as a national identifier or letting its use spread unchecked cannot help but contribute to public distrust of government," the report said.

- Handling of crime statistics and summary criminal histories ("rap sheets") might be taken away from the FBI, in favor of an independent national agency with public representation.

Such an agency would have to be established, the report said, "with a clear legislative mandate to be a 'guardian' institution," with particular attention to civil liberties, as well as law-enforcement needs.

Not Advanced

Despite public worrying by civil libertarians and computer experts, the report said, "central data bank developments are far from being as advanced as many public commentaries have assumed." Companies still rely on paper files for sensitive information, the report suggested.

The committee did not find reliance on computers for impersonal decision-making or data collection, and where this did occur it had been "carried over from the high-volume 'processing' of people in the manual area."

Furthermore, the report emphasized that "over and over again, the project's findings indicated profound public misunderstanding about the effect of computers on large-scale record systems."

This is partly due to inflated claims and proposals of the users of these systems, according to the report.

Commentators on computers and privacy have failed to do adequate research into the actual operations of systems, the report claimed, adding many have presented "entirely incorrect pictures" to the press and to the public.

While the intent of these people might have been to alert the citizenry to the dangers of computerization, the result might have been the opposite, the report pointed out, noting "we may give up the fight in the belief we have already lost."

The report did acknowledge the newfound efficiency brought to record-keeping by computer use, including more extensive use of information already in the files. There are also "some large data bases of information about people that would not have been feasible without automation."

The most important trend for the remainder of the decade, the report suggested, will be "an increase in the ease with which data can be shared . . . coupled with a reduction in the cost of doing so.

"This will make it imperative that legal boundaries as to data-sharing are set as clearly as possible," the report added.

The report also noted there is little legislation and few rulings in the area of privacy, and that the computer entered the picture at an unfortunate time – just as the traditional authority of government and private organizations was becoming the object of widespread dissent.

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1255 Boylston Street / Boston, Mass. 02215 / (617) 266-4950.

TWA Receives Record Award

(Continued from Page 1)

continued to order more gear, including 10 disk storage systems worth over $2 million and almost 750 agent terminals worth almost $6 million.

TWA eventually switched to IBM for hardware and the standard passenger reservation system, following in the footsteps of United Air Lines, which had cancelled a big contract with Univac because of essentially the same problem: software.

Roy N. Freed, a Boston attorney specializing in computer contracts, said the settlement was the "largest I ever heard of," adding the magnitude of the settlement – estimated in total worth at over $30 million – illustrates the importance of proper contracting procedures at the beginning of an arrangement. TWA officials confirmed the estimate.

Although the suit was filed almost exactly two years ago, a statement by Burroughs President Ray W. Macdonald talked about the benefit of "early settlements" of the TWA breach of contract suit, and the countersuit filed by Burroughs for the unpaid balance.

'Paid on Acceptance'

In its counterclaim, Burroughs had called into evidence the fact that two-thirds of the $38 million had been paid, and that TWA had "agreed to pay . . . upon acceptance of each component."

Under the original arrangement, the hardware was actually purchased by CIT Financial Corp. and leased back to TWA for a period of eight years.

As part of the settlement, TWA reported, the manufacturer will assume all TWA's rights and obligations to the CIT lease-back, so Burroughs will pay CIT some $17 million over the next four years.

Additionally, it was learned TWA could choose a $5.5 million cash payment instead of using the $14 million worth of computers; TWA, if it opts for 10 years of usage, will pay only maintenance costs on the gear.

Cassette Subsystem Basis of Mini Series

(Continued from Page 1)

$476/mo.

Sale prices for the basic L8500 range from $20,990 to $23,990 and lease from $574 to $727/mo.

A typical system with peripherals costs about $35,000, according to Burroughs.

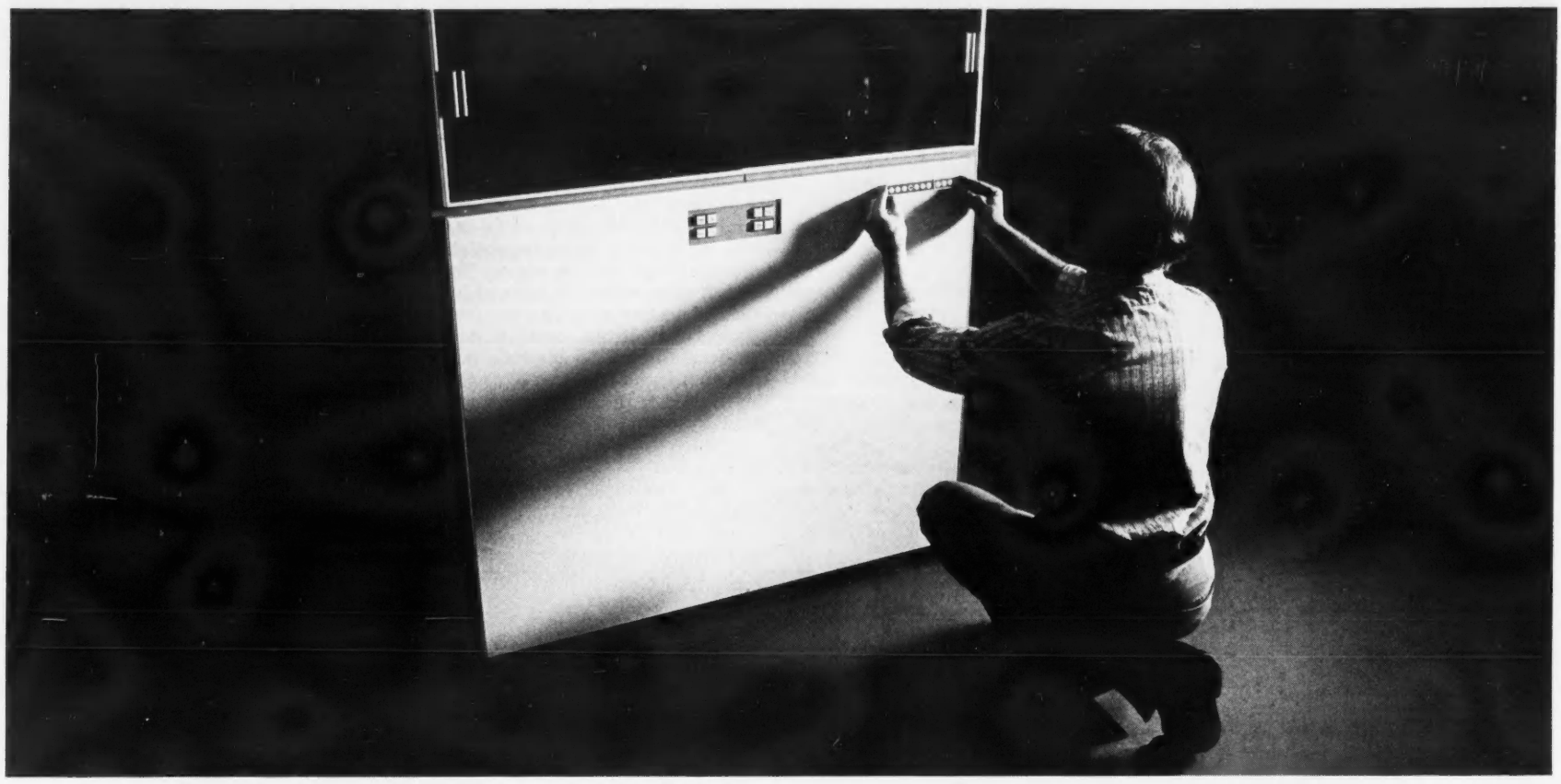
Deliveries on all L8000 minicomputers are expected for the first quarter of 1973.

UK DP Center Kept Busy

HERTFORDSHIRE, England – The computer center at Hatfield Polytechnic here is being kept busy, with about 50 terminals actively on-line at any one time. The center serves about 3,000 students, researchers at the institute and eight schools and 11 colleges in the region.

Within Hatfield Polytechnic are 38 on-line terminals and a video display, of which 27 are available for general student use.

Nineteen additional locations throughout Hertfordshire have terminals linked to the school's Decsystem 1050 by the British Post Office Datel 200 service.



The leader in computer graphics has never made a low cost COM System.

The wait was worth it.

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CalComp had not made a low cost system.

We were too busy perfecting our 1675. We think it is now the finest plotter/printer in the world.

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CALCOMP

Justice Department Outlines Views in Memorandum

The following is the complete text of the Justice Department's Preliminary Memorandum on Relief filed last week in the U.S. versus IBM antitrust suit.

In it the department outlines its present thinking on what it would consider an equitable conclusion to the case – the breakup of IBM into separate companies both here and abroad.

While vague, the memorandum could well be used as the basis for negotiations leading to a consent decree between the government and IBM.

United States District Court
Southern District of New York

United States of America,
Plaintiff,
v.
International Business
Machines Corp.,
Defendant.

Civil Action
69 Civ. 200

Plaintiff's Preliminary Memorandum on Relief

On Sept. 12, 1972, the Court directed plaintiff to submit, on Oct. 16, 1972, a tentative application for relief as seen by plaintiff at this stage in its pretrial preparation (Pretrial Order No. 6).

Because of the protracted nature of this case and the substantial discovery and evidentiary hearings yet to be had, plaintiff is unable at this time to specify with any more significant degree of precision than contained herein the exact relief which it may ultimately consider appropriate to create competition and to remedy the alleged violation of the antitrust laws in the markets involved in this case.

While plaintiff is unable to state that the principles of relief herein set forth will ultimately prove to be the best of many alternatives, the tentative outline suggested herein reflects plaintiff's best economic judgment as of this date, based upon an incomplete and sometimes equivocal factual record.

Inasmuch as this is the present state of the record, this statement is in part premised upon the proposition that divestiture such as that proposed is the normal, natural and appropriate form of relief in monopolization cases under section 2 of the Sherman Act.

Preparation of this statement on relief has demonstrated to plaintiff that, before any type of relief can be finalized in this matter, a more thorough and detailed analysis must be made of the markets which defendant is alleged to have monopolized.

Such analysis will require the development of additional facts through further discovery and evidentiary proceedings involving personnel engaged in these various markets.

This further analysis may demonstrate that other forms of divestiture, or divestiture coupled with injunctive relief, may be sufficient to remedy the effects of the alleged monopolization. However, plaintiff notes that injunctive relief has in the past met with only limited success.

On occasion, such provisions have been overly regulatory, inhibiting rather than preserving or restoring competition in the long run.

Decretal provisions barring entry into specified businesses have adversely affected competition in the prohibited markets. See, e.g., *United States v. Swift & Co.* 276 U.S. 311, 328-29 (1928), *decree modified,* 1971 CCH Trade Cases 73,760 (N.D. Ill.).

Similar provisions can have an adverse effect on competition, incentive and innovation in markets related to the primary business of an enterprise. Finally, highly regulatory decretal provisions can involve inordinate amounts of administrative and judicial time directed toward securing performance of the decreed, See, *e.g., United States v. Paramount Pictures, Inc.* Equity No. 87-273, S.D.N.Y. (filed July 20, 1938).

Accordingly, plaintiff believes that the parties should direct their efforts to achieving a fully developed record upon which to evaluate the future efficacy of this or other forms of relief. Analysis of this record may modify, rule out or reinforce the principles set forth herein.

I.

Upon the present record, should plaintiff prevail at trial, plaintiff tentatively seeks:

A. Divestiture relief designed to dissipate the enormous market power of the current IBM computer manufacturing and marketing structure by the formation of the total domestic and international computer systems facilities of IBM (manufacturing, marketing, research and development, capital, patents and know-how) into several discrete, separate, independent and competitively balanced entities capable of competing successfully in domestic and international markets with one another and with other domestic and foreign competitors.

B. The entities resulting from the divestiture should, after an appropriate transitional period, be relatively unfettered in their ability to engage in domestic and international competition with one another in the manufacture, marketing (including leasing) and maintenance of a broad line of computer systems or any part thereof, or lawfully to engage in any related or unrelated field of endeavor.

C. The relief outlined immediately above should be accompanied by protective provisions designed to insure that the entities resulting from the divestiture continue to provide service effectively to existing users of IBM equipment.

This is to be achieved by injunctive provisions designed to insure all these entities the necessary access to know-how, equipment and parts so that they can provide customers with a broad line of computer equipment, parts, software, maintenance and other services during an appropriate transitional period following divestiture.

II.

Relief should include injunctive provisions designed to prohibit IBM, pending effectuation of divestiture, from acting so as to frustrate the orders of this Court, or to put significant aspects of its business beyond the reach of the Court, including, but not limited to, the following:

(Continued on Page 7)

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Justice Explains Its Views

(Continued from Page 6)

A. Change in ownership or control of subsidiaries or divisions, other than in the ordinary course of business.

B. Change in financial or employment procedures, other than in the ordinary course of business.

C. Realignment of plants, personnel or capital, other than in the ordinary course of business.

III.

Relief should also include injunctive provisions designed to prohibit IBM, pending effectuation of divestiture, from:

A. Marketing its computer systems or any part thereof, its software, and its support services by the use of bundled prices.

B. Pricing any computer system or any part thereof, its software, or its support services at loss or other predatory levels, or discriminating in price, for the purpose or with the effect of hindering competition.

C. Announcing new computer products or systems prior to the time that such products or systems have reached the point of manufacturing and marketing feasibility, for the purpose of hindering competition.

Raymond M. Carlson
Joseph H. Widmar
Attorneys,
U.S. Department of Justice
Dated: Oct. 13, 1972.

Bill Would Aid CAI Assessment

WASHINGTON, D.C. – Methods of assessing the need for – and effectiveness of – educational technology systems such as computer-assisted instruction (CAI) would be developed by a new commission called for in a recent House bill (H.R. 16572).

One of the main purposes of the Council on Educational Technology called for under the measure introduced by Rep. Orval Hansen (R-Idaho) would be to bring "together representatives of various educational users of technology for the identification and articulation of common needs and concerns."

The group would also have the mandate to foster communication between educational technology users, manufacturers and distributors, according to Hansen.

"The need for such a Council is well recognized," he said recently. I have "received very strong indications of interest and support for the establishment of a council which would delineate and work to resolve both informational and technical difficulties impeding the full use of educational technology," he added.

Definition of Needs

He noted that one of the major problem areas in the field at the present involved the definition of educator's needs.

"Although educators often complain that available technology does not fit their needs, they have thus far successfully resisted providing manufacturers with precise descriptions of the qualities they need in products to facilitate the educational process.

"Neither have they accurately defined, in many cases, the instructional objectives they hope to reach through use of educational equipment . . . . It appears that greater precision on the part of educators in describing their needs can be achieved and would enhance the ability of manufacturers to respond to those needs."

Therefore the first job of the group would be to develop precise descriptions of what educators want and need from such systems as those used for CAI, he said.

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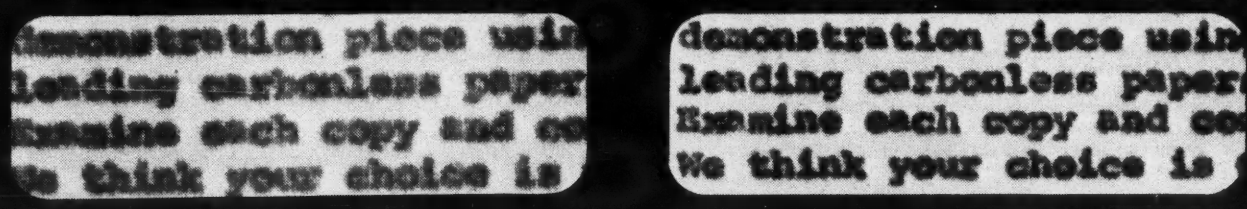

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theirs* ours*

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The Computerized Campaign — Part III

Critics Claim Less Candid, Dehumanized Elections

By E. Drake Lundell Jr.
Of the CW Staff

WASHINGTON, D.C. – While computer mail systems are growing popular with politicians, especially since TV spending is restricted under the new election law, the technique is not without critics.

And even the most ardent proponents of computer-based mailings admit that mail pieces have to be well done to be effective and can be disastrous if not handled correctly.

Criticism comes in two forms – first, computer-based mail techniques allow politicians to modify their stands on certain issues for certain groups, and are therefore less than candid; secondly, the techniques dehumanize election campaigns.

Common Cause, the national non-partisan citizen's lobby headed by John Gardner, former Secretary of Health, Education and Welfare, has promised to keep a close watch on computerized mailing operations for possible fraud.

But Gardner indicated that misleading statements could be even more dangerous than outright fraud in the use of such devices.

For example, he noted, the systems can tailor letters to low income people promising to raise wages and put more people to work, while the letters from the same candidate to higher income voters would promise to cut taxes and make no mention of the pledge to put more people to work.

In television advertising, the candidate would have to expose both parts of his campaign to all of the voters, thereby allowing them to make the choice on the candidate's full program, not just a part of it tailored especially for their interests, Gardner indicated.

Computerized campaigning is all part of a "strong movement to lock the candidate in a closet and put the image makers to work," he said.

"The candidate will not be allowed to expose himself to unexpected questions or unexpected situations," he added.

Other critics of the practice have said computerized techniques allow campaigners to use a subtle form of deceit on the general public.

"A campaigner can put very general 'image' type ads on television and keep his speeches very non-specific," one critic said, "and then tell the voters only those parts of his program they want to hear through the computerized letters.

"With this type of exposure, the voter doesn't really know all that a candidate stands for, just those portions of the candidate's program that the voter concurs with."

However, backers of the technique say it allows more "personal" interaction between voter and candidate by letting the voter know specifically how the candidate feels about the most pressing problems facing that voter.

"This is really more Democratic," one proponent explained. "In speeches and TV ads, the candidate cannot discuss every issue that is bothering the voters except in a general way. Through the letters, he can outline his specific proposals on issues of importance to that voter so the voter can evaluate his program in that area."

Election Process 'Impersonal'

There are also several critics who are against the technique because it makes the election process "impersonal" in their view.

"I want to see and hear the candidate," said a Miami cab driver during the Florida Democratic primary this year, "not just get a letter on how he thinks on one issue. I throw the letter away before I even read it."

The voter, another critic said, "should be able to see the candidate in action, answering questions on hard issues. He should not just be fed 'pap' that happens to agree with the way he feels about an issue anyway.

"After all," he continued, "the voter is choosing a man to run the country for the next few years. The man's personality and how he does under intensive questioning are as important as his stands on certain issues which are written by staff people anyway."

Even the backers of the technique admit that if not handled properly the direct mailings can work against a candidate more than they work for him.

"Most of the mailings I have seen are poorly prepared and amateurishly executed," according to one of the direct mail people who has worked in several campaigns, including this year's primaries.

"Sometimes they are handled like an announcement of a going out of business sale for a used furniture shop," he said, "full of bright colors and cliche jargon.

"Often the pieces," he added, "insult the intelligence of the voter because they are written at a very elementary level. The voters don't like being talked down to, and will resent a candidate if his mail campaign seems to do this.

"If it is poorly run, the mail technique can backfire just like any other political device," he said, "but many campaigners, awed by the power of the computer, don't seem to realize this yet."

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To add IBM memory to your Model 155 requires processor modifications. These cost from $12,000 to $125,000, depending upon the number of "ports" your memory uses. 370/STOR uses only one port per two megabytes, so there is absolutely no requirement for processor upgrade. That alone can be a huge savings. No one else offers such a feature.

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FACT # 6. THE PRICE STORY.

We saved the best for last. 370/STOR saves you from 30 to 60 per cent, not including the substantial processor savings that you'll enjoy. To convert that to dollars: two megabytes of memory from IBM costs approximately $1,000,000. From Cambridge, it costs $480,000. You save over a half a million dollars. Our lease terms are just as attractive.

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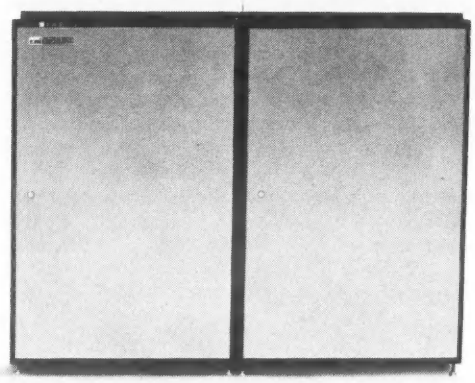

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Rent Collection Gets Tighter Controls

Special to Computerworld

SYDNEY, Australia – Real estate agents in New South Wales with long lists of tenants who owe rents are using a computer service company to strengthen day-to-day management control over accounting and the large cash flow they handle every week.

The Real Estate Data Processing Pty. Ltd. serves at least 20 clients in Sydney, Newcastle and Wollongong and has virtually eliminated their bookkeeping. The agencies involved collect rents varying from 75 to 3,500 tenants.

Running a telephone-controlled courier service the computer-company operates a daily collection of all cash transactions between the agencies and the tenants of properties they supervise.

A statement is produced twice a week for the agents showing moneys collected from individual tenants, arrears, expenses for repairs, giving the type and repairer, payments for services such as caretakers and gardeners and payments made for water, gas and electricity.

Specially printed check forms, forming part of the statements, are automatically made out for the various services.

Police 'Slow' In Sophisticated Computer Use

By a CW Staff Writer

NEW ORLEANS – The criminal justice community is backward in using computers.

Tell this to a felon and he may scoff. Tell this to a civil libertarian and he may spew forth real and/or imaginary "big brother" applications. Tell this to an audience of police specialists, and they ask for more.

One example was all that was needed for George Hall to prove his point. A newspaper was recently asked to perform a simple computer run for a major police department – a breakdown of incidents by precinct.

Hall, director of the Law Enforcement Assistance Administration's statistical division, criticized the fact that a newspaper could perform such a basic application for a supposedly DP "sophisticated" police operation.

"By and large, the criminal justice community is more backward" in data handling than other disciplines, Hall charged here recently.

Police departments may have huge systems to retrieve information on individuals, and the criminal justice community may be developing crime-specific, offender-based, and other state-of-the-art applications, but they fall short on criminal statistics, he said.

Hall called on law enforcement agencies to develop quality control procedures and audits, so that statistics would not come under continual criticism and question.

"Valid, reliable data" is the most important element in crime statistics, Hall said. Number two in importance is the completeness of data, followed by flexibility, so data can be massaged to create meaningful reports, he added.

Avoid Post-Operative Complications...Get A Bedside Terminal

COLUMBUS, Ohio – A computer is being assigned the task of "bedside teaching" for patients in hospitals linked to the Ohio State University College of Medicine DP center.

Patients communicating through terminals in the hospitals receive individualized instruction on post-operative activities and restrictions, what to expect after surgery and recommended diets.

"This type of instruction," said Jim Griesen, director of research in medical education, "is a very necessary part of the total medical program, since certain procedures must be followed by the patient to avoid future complications.

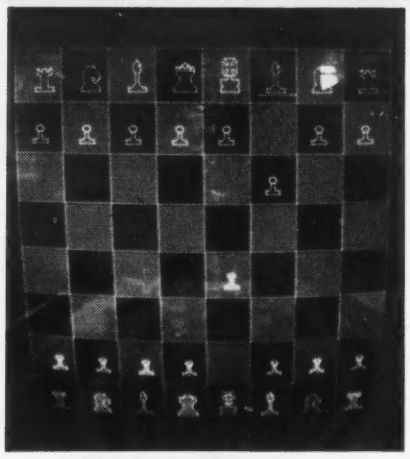
"Furthermore, the computer can provide opportunities for drill and practice for such things as menu planning and exercises for a diabetic mother with a family of six," he added.

The terminal produces a printed copy of the learning exercise which the patient can take with him. The doctor can be assured the patient gets the information he needs, since a patient cannot complete the exercise without responding correctly to a number of key questions.

With such help from the OSU IBM 360/40, health professionals can devote more time to special problems, which the computer might be programmed to call to their attention.

DP May Aid Language Instruction

MOSCOW, Idaho – A University of Idaho professor has predicted expanded use of computers in the instruction of foreign languages. Prof. Demetrius J. Koubourlis has outlined his own program for teaching Russian, which he hopes to implement on the university's computer



Quiet Partner

With the world championships pushing interest in chess to an all-time high, everybody's playing the game – and if you can't find a human partner when you feel like playing, call your local computer. This game is being played on a DEC PDP-15, where the battle lines are literally drawn on the CRT.

Rich Get DP Runaround

By Molly Upton
Of the CW Staff

TALLAHASSEE, Fla. – Because the state Department of Revenue was unable to crossmatch two separate computerized lists used to mail "intangible-" tax forms to "the maximum number of potential taxpayers," "literally thousands" of persons received two forms and then found themselves classified as "delinquent" after they had filed one of the returns. Intangible tax is a state tax on individuals' cash holdings of over $50,000 or on security holdings of over $5,000.

The department used local tax assessors' roles, listed by name, and the IRS lists, organized by Social Security number.

When persons returned only one form, they were classified as delinquent on the other list, because the department "couldn't crossmatch alpha to the numeric files," bureau chief Bill Boyer explained.

If persons had just received instructions to return only the form generated from the Social Security listing rather than the local one, the problem of delinquents would have been minimized, he admitted, as more persons would have been marked paid. The Social Security list is becoming the master list.

"If we had know what was going to happen, we never would have given them the option of deciding which return to submit," Boyer observed.

Because of the file incompatibility, delinquencies mounted up on both lists, and the department had to send out a notice saying to clear its records it needed the recipient's Social Security number.

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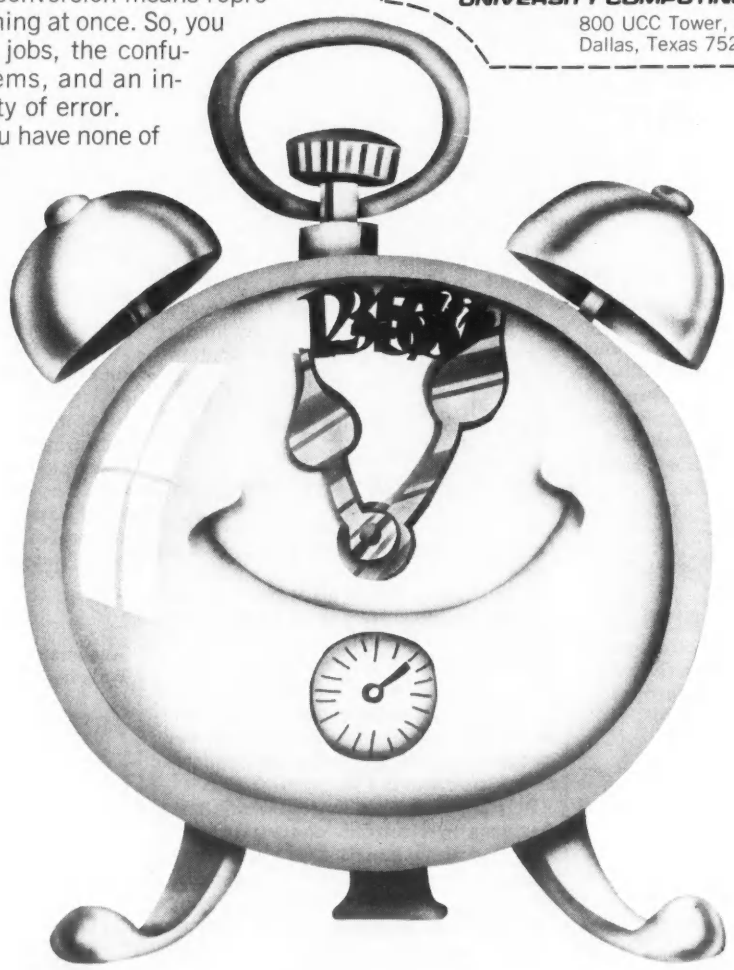


Editorial

Redoubling the Effort

IBM attorneys have said it is "time to fish or cut bait" in the current antitrust suit between the Justice Department and the industry leader.

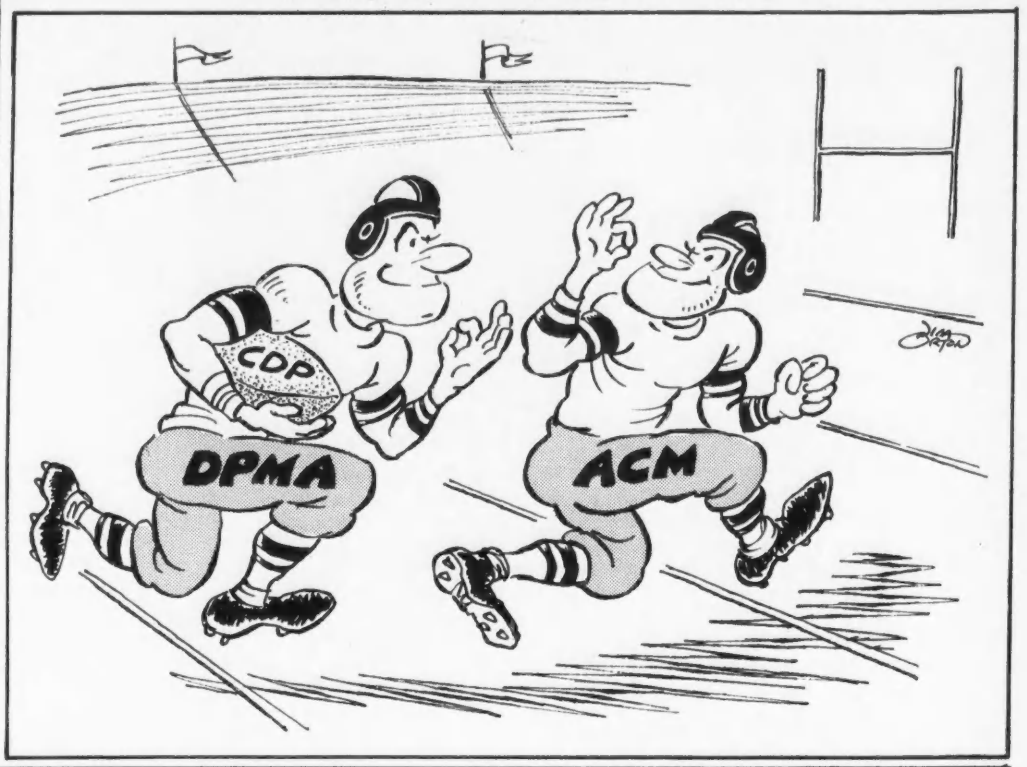
And because this is one of the most complex – if not the most complex – antitrust suits since the Sherman Act has been on the books, the issues need careful study. They will eventually affect almost every U.S. business, every computer user and eventually the general public.

The Justice Department has been actively investigating the case for six years. This should have been ample time to assemble all the information needed to try the case.

If the Justice Department is not prepared to bring its case to trial at this late date, it is either due to lack of initiative on its part – a lack of initiative which would be a serious betrayal of its public trust – or due to a lack of sufficient manpower and money to push its case through the courts.

The complexity and far-reaching ramifications of this case demand nothing short of an all-out effort on the part of the Federal Government – adequate financing and personnel. To paraphrase IBM, it is now time to act.

Who'd a' Thunk It?



Letters to the Editor

Realistic Entry-Level Certification Needed

I heartily agree that DP needs certification of computer programmers [CW, Oct. 11]. However, it appears that certification after five years of employment is a "bit" late.

Will the DPMA and ACM seriously consider the certification of entry-level computer programmers and systems analysts? Who will have the responsibility of devising these certification tests?

Employers could use a realistic entry-level certification to separate the chaff from the wheat.

Ron Carswell
Associate Professor
Computer Science Technology
Texas State Technical Institute
Waco, Texas

Are We Forming a Gang To Commit Same Crime?

The Oct. 11 article on "DPMA and ACM Plan Joint Certification Foundation" seems to suggest that we want to form a gang to commit the same crime previously committed by one group.

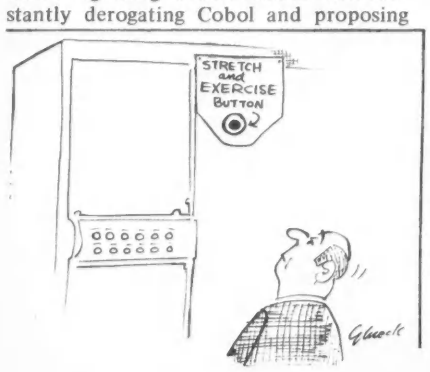
Before we start certifying anybody, let's establish what profession we are supposedly in in the first place. It seems we have extreme difficulty in shaking our "bits and bytes" mentality.

But then again, hasn't that been the constant problem we have had in designing information systems since the beginning. A real profession does not have a fetish with the tools of its trade.

Milt Bryce
Cincinnati, Ohio

Why Not Promote 'Meeting Of the Minds on Cobol'?

I have noticed articles in *Computerworld* regarding Cobol. Rather than constantly derogating Cobol and proposing to completely eliminate Cobol to conjure up a "new" language, why not promote a "meeting of the minds" among computer vendors, Codasyl, data processing societies and associations, and foremost, data processing installations which must live with the results of decisions made by those who are possibly influenced by the "marketing" and "politics" of it all.



It is well to note that continuous turmoil is not conducive to the primary objective of providing tools on which the management "user" can base his decisions.

Data processing is a service to those who desire and require information in order to function effectively. Therefore, while you are rewriting, recompiling, reorganizing, etc., try to keep in mind the guy who needs a better production and inventory control system or an improved sales forecast.

Jeffery R. Rupp
Mfg. Systems Supervisor
Penn Controls
Oak Brook, Ill.

Questionnaire Can't Solve Problems With Cobol

The problems with Cobol can't be solved with a brief questionnaire [CW, Oct. 11] any more than Mayor Lindsay can unriddle New York's problems by holding a town hall meeting in Yankee Stadium.

F. Gerard Mueller
Director, Data Processing
Los Angeles Community Colleges
Los Angeles, Calif.

'Let Cobol Die by Attrition'

In response to Joe Celko's letter [CW, Oct. 11] regarding "junking Cobol," I say hurrah!

Cobol has to be the great monster lurking in many different data processing installations behind the guise of a business-oriented language. Most profitable businesses are efficient; Cobol is not.

So many programmer hours are wasted in producing the vast amounts of code necessary that the delay in compiling Cobol programs is a welcome respite.

In the short time that data processing has been by electronic computers, we, as so-called professionals, have not been able to enforce standards for this language. Each vendor has elected to provide a "compatible" version for its own machine.

Let Cobol die by attrition, as we embark in producing standards for a true MCL (Man-Computer Language) containing modules allowing coding in a manner best suited to the task at hand.

Thomas H. Politowski
Systems Analyst
Resource Control, Inc.
Lansing, Mich.

An Alternative to Verbosity

I find Joe Celko's idea on scrapping Cobol very refreshing, especially opposite Alan Taylor's regular verbosity on Cobol standards

Howard W. Radke
Systems Analyst
U.S. National Bank of Oregon
Portland, Ore.

'Those Horrible Letters'!

It seems to me that *Computerworld* is nothing more than an encyclopedia on IBM. Every page has to have those horrible three letters. Why don't you print that under a Republican administration IBM is strangling all competitors and that nothing is being done about it? Or are you one of those who seems to think that only IBM should exist in the vast computer business?

M.F. Palla
Boston, Mass.

Mumps Available in 1971

In the Oct. 11 issue an article states that the DEC implementation of Mumps on the PDP-11 is the first PDP-11 Mumps system available.

Automated Health Systems has been delivering PDP-11-based Mumps systems complete with applications since June 1971, as announced previously in *Computerworld*. Our systems include all the features of the original Mass. General Hospital Systems, plus many enhancements.

Stanley M. Rose
Systems Development Manager
Automated Health Systems, Inc.
Wakefield, Mass.

Just Kicking the Tires?

Sykes Datatronics, Inc. takes strong exception to the item on page 15 of the Oct. 4 issue of *Computerworld* concerning the new cassette system introduced by Digital Equipment Corp.

We have no quarrel with CW, but want to declare publicly that at no time was Sykes equipment evaluated in any sophisticated way. As a matter of fact, Mr. Leis, whom we presume was the DEC spokesman, gave our unit the same type of cursory review that the uninitiated give to a new car – slam the door (ours, too, is quiet yet positive); look under the hood, (we also have an impressive power plant); and look at the dashboard (admittedly, ours is a bit barren).

I suspect that if the Sykes cassette system had wheels, Mr. Leis would have kicked the tires.

Sykes does not intend to question the technical competence of Mr. Leis. We simply question the sincerity with which he "evaluated" cassette units. More importantly, we resent the implication that DEC's is the only reliable unit.

Those of us who have been designing, building and selling cassette systems for as long as four years have worked hard in difficult times to prove that cassettes and cassette drives which operate reliably are and have been available.

Thomas S. Schaff
Manager of Marketing Administration
Sykes Datatronics, Inc.
Rochester, N.Y.

In Another Place

In the Sept. 20 issue under Random Notes, page 15, there is the statement that "the Cotune execution-time analyzer package for Cobol programs, developed by United Data Services Inc., is now available from Capex Corp. as part of its Cobol optimization line."

I feel I should inform you that United Data Services, Inc., a Franklin, Pennsylvania-based company, has had no dealings with Capex Corp. regarding the subject of the article. *Computerworld* has apparently confused our organization with another organization.

Leonard M. Carroll
Controller
United Data Services, Inc.
Franklin, Pa.

The "United Data Services, Inc." from which Capex acquired Cotune is located at Suite 103, 20 California Ave., Palo Alto, Calif., 94306.Ed.

Computerworld welcomes comments from its readers. Preference will be given to letters of 150 words or less. *Computerworld* reserves the right to edit letters for purposes of clarity and brevity. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

A Light in the Forest?

Ordinary Users Not Represented By the Codasyl User-Barons

The final technical authority on the Cobol language is the autonomous Programming Languages Committee (PLC) of Codasyl. True, there is a Codasyl Executive Committee which meets for a few hours four times a year. But it cannot refuse to approve the "technical" PLC actions.

There is a Cobol Standards committee, organized under the sponsorship of the Business Equipment Manufacturers Association. But they cannot make any change in Cobol which PLC has not made first.

The Taylor Report
By
Alan Taylor, CDP

The power to change even a comma has been delegated by the standards committee to PLC. This was a part of the price paid years ago to obtain effective co-operation between Codasyl and the standards organization. PLC is on the top of the pile – and is staying there.

PLC is using its powers also. It makes changes to the Cobol language at most of its meetings, which occur every six weeks or so.

Owners and users of Cobol programs would be shocked to see the rate of change that currently exists in the language, but they might be relieved to hear the Committee is user dominated as nearly two-thirds of the PLC members are users.

Users might begin to have second thoughts, however, when they find out that most of these "PLC users" are large, multi-computer-owning organizations which have many government contracts – or else are government departments themselves. They certainly are users of Cobol, but they are not very representative of the ordinary user with just one machine.

As a result of this imbalance in user representation neither the Cobol user with a single installation, nor the programmer who wishes to produce highly productive code, nor the operational areas which wish to have the "commonality" and capability of moving their programs up and down (to protect their programming investment), nor the software developers, nor the schools teaching Cobol, nor the many other interests involved are being represented in the task of keeping Cobol common and yet effective.

Any readers in any of those categories should now consider whether or not they are being properly and adequately represented in "Cobol government."

Last User Slot

Adequate representation is of particular importance at this time because at the PLC August meeting Chairman Ronald Ham filled the last available user position on the committee with yet another large multi-computer installation with strong government connections, as he ignored the claims of at least four other applicants for membership.

The seating on the committee is awarded by the officers of the committee and no-one else has any say in the matter.

In this case the decision was made by Chairman Ham of Honeywell and Acting Vice-President William C. Rinehuls of the U.S. Air Force. (There is an acting PLC vice-president because the previous vice-president, M. O'Connell, left Sanders Associates, a government contractor in New Hampshire, some months ago, to join North American Rockwell – another large multi-computer user.)

The choice of these committee officers – surprise! – was North American Rockwell, so M. O'Connell will presumably be able to take up the vice-presidency again. Nice, isn't it?

Legal Points, But . . .

There is at the moment little a user can do about it. He can raise some legalistic points, such as the recording of the votes of the officers. (These are supposed to be recorded, but recently in checking the PLC archives in Rinehuls' office I found no such voting records). Yet it is important that the rights of the ordinary user are protected.

It is important that he is protected, because the current power structure of Cobol ignores many of the major requirements of Codasyl itself! If users want to get the advantages promised by Cobol, then the PLC situation will have to be corrected to get the proper representation of users.

That then is a question for the reader. The means of doing something are there – we can use some of the legal points to bring up the validity of the representation.

The user need is there – to ensure that Cobol remains as common as is technically feasible – to maximize the protection of the users programming investments. And this need occurs in single-user installations and in commercial shops which do not have access to government contracts.

Such users would also probably have something to say about the development of a capability to have a proprietary "customer-lock-in" version of Ansi standard Cobol. This development is made possible by the PLC definition of what constitutes "Standard" Cobol. This allows proprietary "extensions," that are not offered to the other Cobol implementors, right in any Ansi Standard Cobol. Just a little gimmick that can effectively destroy the whole idea of protecting programming investment!

So the little user suffers, while the large ones can simply put their prices up to cover the additional costs.

There is also a need for effective and efficient programming. This also is not being attended to, other than by government departments and large firms. Outside in the general DP community, there are many efficient and effective programmers who wish to work on Cobol development.

Donald R. Weir, for instance, is such a person as PLC knew when North American Rockwell was placed in the last user slot. He comes from Clifton, N.J., and works as a programmer analyst on a Univac 1106 at a Butler, N.J. firm. He wants to help PLC – but apparently will not get an opportunity under the current regime, any more than any other ordinary programmer will.

Programmer Positions

And yet, unless Cobol programming is kept as efficient as possible, the very livelihood of Donald Weir – and of many other Cobol programmers – is going to be affected. Currently, Cobol programmers are perhaps the biggest single source of manpower and program design available. Certainly they are in the business area. But the number of positions they hold is directly related to Cobol efficiency, and to their protection of users programming investment.

Yet user programmers receive no representation on the PLC committee!

Codasyl Maintenance

Finally, doing something about the present Cobol situation is worthwhile simply to maintain the basic functions of Codasyl itself. The purpose of Codasyl, as well as to produce a common language, was to provide a forum for the interchange of views. Currently, the only interchange effectively taking place is between the U.S. and European manufacturers, the U.S. and Canadian governments, and a few large commercial firms.

The ordinary American user is left outside.

Over the years Codasyl secrecy has developed, so that the swapping of information between the parties, while keeping it private from the users, has become a valuable corporate asset.

"We are not there for philanthropic purposes," AT&T representative Robert Kearney told me recently. "It is worth our while being there so we can know what is going on." As a result, AT&T will probably continue indefinitely as one of the hereditary user-barons of Cobol – because once on the committee, as long as you pay your representative's travel costs, you stay on. Why should they ever leave?

If Cobol is to progress – in efficiency for small installations, in programming investment security, or as a productive forum – PLC must be brought under real user control, instead of the fake type that currently exists. If you want this to happen – please fill in the coupon and we will see what we can do – together.

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Survey of Professional Opinion
Regarding User Representation on Codasyl

1. Do you believe that government departments should make 50% of user representation on Codasyl PLC? ☐ Yes ☐ No
2. Do you think that large multi-computer firms, such as AT&T, Westinghouse, U.S. Steel, etc. should make over 40% of the user representation? ☐ Yes ☐ No
3. Do you believe you are being represented by such representatives? ☐ Yes ☐ No
4. Do you think that protection of program investment is an area that should be specifically represented on PLC? ☐ Yes ☐ No
5. Do you think that improvement in programmer productivity is an area that should be specifically represented? ☐ Yes ☐ No
6. Do you think that maintenance of the Codasyl goals of public operations, vision of an effective forum, etc. should be specifically protected? ☐ Yes ☐ No
7. If a framework emerges in which it is possible to obtain improved representation for your firm, or your profession, will you be able to help – if so, how?_____ (Time, Financial support, etc.)
8. How can you help at this time, when it is still uncertain that we can succeed in doing anything?_____

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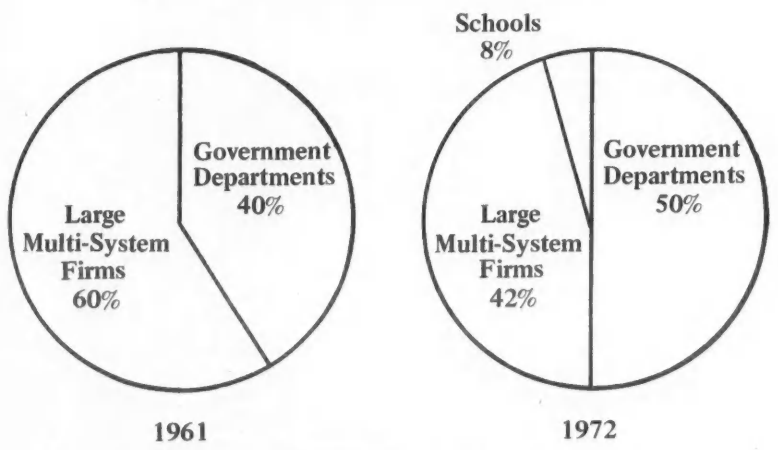
User Representation
On Key Cobol Committees



The size of government and large-installation representation in the user groups on key Codasyl committees can be seen in this chart.
The 1961 figures come from the committee which developed Cobol-61, while the 1972 figures come from the PLC as it was organized prior to the admission of North American Rockwell into the final user-slot available under committee bylaws.

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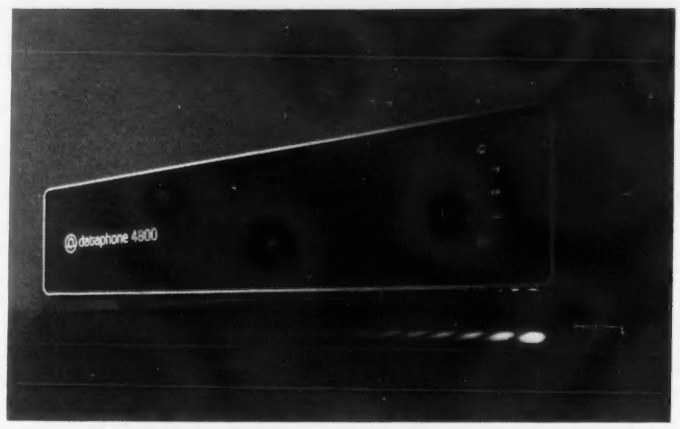

The Bell System's new solid state 4800 data set is designed for transmission at 4800 b.p.s.—and it's economical.

This set cuts transmission costs three ways. First, the charge for the set itself is low.

Second, an automatic equalization feature makes it possible to transmit at 4800 b.p.s. over basic, *unconditioned,* private-line facilities.

Third, it features rapid startup and turn around—ideal for polling applications.

This new, compact data set also offers the convenience of local and remote loop-back testing as well as status indicating lamps.

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Rehabilitation Center Seeks Computer Help

By Charles Downs
Special to CW

SAN FRANCISCO – Synanon Foundation is looking for a computer.

The California-based drug rehabilitation community has grown in little more than a decade from a small group of ex-addicts to a nonprofit corporation with a population of about 2,000.

Ideally, the computer – or the cost of leasing one – will be donated to the foundation by someone or some firm which would like to make an investment (tax deductible) in a community where no one uses drugs or alcohol, where there is no physical violence, and where "no smoking" signs aren't required in the DP center because no one smokes.

A small- to medium-size business-oriented computer, an IBM 360/22, for instance, would do just fine.

Synanon needs a computer for the same reason any other business needs one (Synanon is in the people business). It operates a sales organization called Synanon Industries which provides companies with advertising specialty items.

Sales have increased from $1 million in 1968 to $3 million in 1971. Sales for 1972 are expected to top $5 million and reach $10 million by 1974. The income from these sales accounts for a substantial share of the foundation's revenue.

In 1971 Synanon Industries typed 21,000 purchase orders and 22,000 invoices. It processed 430,000 pieces of paper – all by hand.

This year, with a paperwork Waterloo lurking in the background, the firm is trying to acquire a DP system to replace the present card punch and sorting equipmnet.

The computer will be used to support all Synanon activities including education, research, community health, transportation – as well as for its bread-and-butter chore, Synanon's advertising specialty business.

Anyone interested in additional details about donating or leasing a computer or DP supplies to Synanon Foundation should contact Joel Kibbee, Synanon Foundation, 2240 Twenty Fourth St., San Francisco, Calif. 94110.

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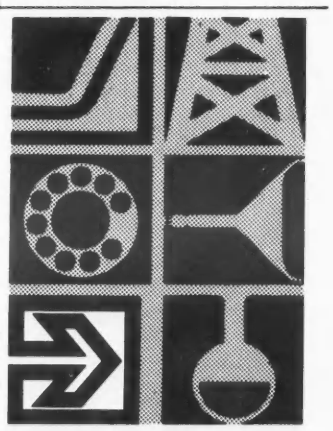

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Random Notes

$200 Application Packages Include Cobol Source Code

PITTSBURGH – Four separate application packages – Raw Materials Inventory, Finished Goods Inventory, Accounts Receivable and a Mailing Label System – are available for $200 each from the developer, Quantum Associates.

Each system is delivered with Cobol source decks, test transactions to develop user familiarity and documentation to provide explanation of how the system works. They are "self-installable," but on-site support is available, Quantum said. The systems are designed for use in 32K under DOS/360. The company is at P.O. Box 7597, 15213.

Banks Gain Data Base Support For Honeywell 400, 600 CPUs

WELLESLEY HILLS, Mass. – Banks using Honeywell Series 400 or Series 600 mainframes can create and maintain an integrated data base showing all data of each customer's relationships with the bank, and access the data through a video-display system, with the Business Information System Network (Bisnet) package from Honeywell.

Bisnet can locate and retrieve a customer's file by almost any desired element within that file, in five to six seconds, a Honeywell spokesman said. The files can be accessed by several users concurrently, he noted.

Compu-Serv Network Expands

COLUMBUS, Ohio – Subscribers in California and Michigan now have dial-up access to the Decsystem-10s that make up the Compu-Serv remote computing network. The company opened new offices in Los Angeles and Detroit last month.

With the opening of the California operation, the network now is nationwide, having earlier established a sales office in the New York City area. Headquartered at 1395 W. Fifth Ave., here, Compu-Serv provides In-Wats service for its subscribers in Ohio.

Datacraft Adds Fortran

FT. LAUDERDALE, Fla. – End users of Datacraft minicomputers are no longer limited to programming in machine-level or assembly language. The company has introduced a diagnostic Fortran compiler, called Forgo, which operates under any of the available operating systems.

Load-and-go Forgo is intended for use in debugging and the Series 6000 version includes both compile-time and run-time diagnostics. A trace feature and a dump routine which provides a printout of values at the termination of a program are also part of Forgo, Datacraft said from P.O. Box 23550, 33307.

360/67 User Warns:
Charging for VS Use Poses Problems

By Don Leavitt
Of the CW Staff

ARLINGTON, Va. – Users concerned with accounting for machine and device utilization will find several problems if they shift their operations from real to virtual memory systems, according to John G. Nugent of the National Military Command System Support Center (NMCSSC).

Nugent is in charge of all accounting routines at the center, including the implementation of charging algorithms for an IBM 360/67, the predecessor of the virtual 370s. The experiences and difficulties NMCSSC has had in developing those routines should be applicable to the OS/VS1 and VS2 and VM/370 systems recently announced by IBM, he told a recent meeting of the Paces system accounting software users.

The first area usually encountered is in identifying the resources most critically affecting system performance. In the past, the charging algorithms for real systems were most often heavily weighted on the amount of core requested.

Under virtual systems, this is not the case. Now, the critical resource may be CPU time, he suggested, particularly when several OS virtual machines occupy the system at the same time, as they may under CP/CMS or VM/370.

But CPU time may not be the best basis either, he noted, since "the OS virtual machine does not necessarily know the true time of day." A peculiarity in the timer updating "can result in the loss of up to seven or eight hours in a processing day," he said.

The use of two different operating systems in the virtual machine environment may create so much overhead as to severely impact the execution speed of programs run under one of the systems, Nugent noted.

If charging is based on duration of the terminal session, he asked, should not some adjustment be made for the increased time due to other users of the system?

He also suggested the job written with efficiency in mind should probably not be charged at the same rate as one that is not. But he admitted later it would be difficult to determine which jobs were in fact "written with efficiency in mind."

The most difficult problem in accounting for a virtual system, in Nugent's view, will probably be the determination of exactly what effect any one given variable has upon the system performance, both independently and in conjunction with other variables. The effect of any variable may change as the type of work being done on the system changes, he noted.

Another factor which should be considered, he said, is the amount of system overhead a program creates by its paging activity, channel program translation, etc.

Watch Overhead

Virtual machines may have either real, dedicated devices or simulated virtual devices. In one case, the cost of having the device unavailable to other users should be considered. In the second case, the amount of overhead needed to simulate the device should not be overlooked, he said.

Finally, in most installations – only indirectly related to the hardware – managers expect the same job to receive the same charge within certain limits each time it is run. It is possible, "if great caution is not exercised" in building the charging algorithm, for the charge for any one job to fluctuate wildly given the variance in the system workload, which is outside the control of the job itself, Nugent noted.

Univac Updates Series 70 VMOS, Version 9 Meets User Requests

CINNAMINSON, N.J. – With the release, on schedule, of Virtual Memory Operating System, Version 9 (VMOS-9), Univac continues the major software support it pledged when it took over the RCA (now Series 70) user base at the beginning of the year.

VMOS-9 provides several major internal control system improvements for the four Series 70 processors (the 70/46 and 61, and the 70/3 and 7) that can utilize the software.

The changes include:

- Additional batch-oriented priority task scheduling.
- Improvements in the handling of spooled output files and the devices to which they go.
- Modifications to provide a single operating system – with a common object code system – for all four CPUs.
- Automatic alternate track assignment for random-access devices.
- Remote batch processor enhancements.
- Enhancements to RPG, Cobol and other language components.

The priority task scheduler is now available to all configurations, whereas it had been previously implemented only on the 70/61 and the 70/7. This change will maintain the queue of batch tasks waiting to be scheduled in priority order, and give special treatment to highest priority batch and interactive tasks.

The improvement in spooled operations includes the ability to direct output for spooling to tape, by operator command, for off-line printing; enhanced forms control procedures; and improved error processing. Full compatibility with previous control commands has been maintained, Univac noted, with one minor exception.

The common object code system of VMOS-9 provides that all model-dependent differentiation is performed during system generation or initialization, so only one set of source modules need be maintained. The system is built from the version that has been run on the 70/7, the company noted.

The remote batch processor has been modified to change the Wait Between Terminal Transmission interval to decrease system overhead, and to permit the accounting of Dalta file space and remote batch terminal time.

The language enhancements, like most of the other changes in VMOS-9, are in response to user requests as well as Univac staff planning.

20% Cut From Cobol Run Times

WASHINGTON, D.C. – DP managers may now be able to cut the execution time of their Cobol-based programs by as much as 20% to 73% with an optimizer service from Universal Data Services Inc. (UDS).

The service works at the source code level. The optimizer makes a simulation run of the program to be optimized, timing the code that is then in place. Next, it determines replacement source coding which would generate fewer executable instructions while still performing the desired logical processing steps.

The service eliminates redundant coding, the company claimed. By changing only the source coding, the optimizer allows the programmer to "retain complete control of his program," according to UDS.

The kind of hardware used by the client is said to be immaterial, although, UDS warned, "best reductions cannot be guaranteed for computers that are not word-oriented."

The charge for each program processed is 50% of the first year's savings in execution time for that program. Presumably the amount of savings would have to be mutually agreed upon by UDS and the client before the optimized program is released.

The charges may be paid on a monthly basis, UDS said from 1750 K St., NW, 20006.

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'Mark III' Provides 'Complete Service'

BETHESDA, Md. – General Electric has added strong elements of background processing capability to the previously well-developed interactive foreground and national network facilities of the company's Mark II service to create Mark III.

The result is a three-pronged DP tool that is a far cry from the classic engineering-oriented, problem-solving time-sharing service pioneered by GE.

The background or batch-oriented facilities that GE is now making generally available include high-speed (2,400 baud) data transmission lines that can support any remote job entry terminals or the interconnection of a user's own CPU with the GE network, according to Dr. James Castle, marketing manager for GE's Information Services Business Division.

Now, he said, any GE network user will be able to install an order entry system, such as Booth Fisheries pioneered [CW, June 28], linking corporate headquarters in one city with processing plants, or sales offices, in others.

In addition to remote job entry, the high speed lines and GE's use of a single computer super-center (in Cleveland, Ohio) allow subscribers to operate in an interprocessing mode, Castle noted. In this environment, the user puts his files on the network for interactive use during normal business hours, but pulls them back to his own in-house CPU at off-peak times for batch processing, linking to programs that aren't on the network, and generating management reports that might take too long to produce on the network.

Various subscribers have been using the interprocessing techniques, Castle said, citing the "Trace" system developed for Pontiac division of General Motors as one example. Trace links terminals at key points within Pontiac assembly plants with terminals at Pontiac dealers, so that car buyers can know exactly where their order is and the assembly plants can be better prepared to cope with any trends that develop in buying patterns.

The remote entry jobs are controlled by the foreground processor even when they are actually executed in the background. The close relationship of the two facilities has been extended to the point of supporting the interactive development of Fortran programs which can, with a few changes, then be run in the background.

Cobol capabilities are available from GE, effectively for the first time, but only in the background mode of operation. Castle expects that an interactive compiler/debugging package will be added shortly, but he admitted that it isn't ready yet.

Even as it has outgrown the limited connotations of "time-sharing," the GE operation has also gone beyond the broader phrase "remote-computing" network, Castle claimed, stressing that facilities now available – through GE – allow a user's multiple sites in 250 cities in the U.S., Canada and Europe to share common files that are vital to a company's business.

IBM Provides 3270 Support For Distributor's Entries

WHITE PLAINS, N.Y. – Wholesalers and others can use the IBM 3270 information display system to support their customer services, with the IBM Distribution Order Entry System software that will be available in January.

Developed by Lag Drug Co., Chicago, this "installed user program" (IUP) is said to have many features similar to the Customer Information Control System (CICS) but without the overhead required of the generalized software. Lag's implementation takes only 96K bytes of storage under DOS/360.

Single Data Base

It allows order takers, warehouse personnel and managers, for example, to access a single data base so all areas within a company's operation can be kept aware of current situations, and in turn include their own information for the use of others.

With the CRT, a telephone order taker can enter new requests or review outstanding orders in their entirety, identifying specific items from the customer's perhaps fragmentary description, and checking stock quantities.

Substitutions can be made immediately for items that are out of stock or not carried by the using distributor. While the customer is on the phone, the CRT operator can display the warehouse locations of available items, and thus reduce turnaround time between order and shipment.

The system supports the selective brightness facility of the 3270 – so critical items can be highlighted – and the "read-modified" feature so operators can see the items that have been altered without being confused.

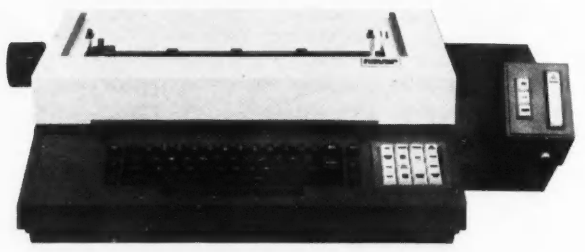
The light pen accessory to the 3270 would be supported by the new software, but isn't really a tool with much use for users in the distribution industry, a spokesman for the developer added.

As an IUP, this system is not heavily supported by IBM. Users will receive newsletter-type notices of changes that should be made, but even that degree of support will be discontinued six months after the program is generally released, the firm said.

The order-entry system will be available shortly after the beginning of 1973, under a license agreement, at a monthly charge of $875 for the first 24 consecutive months. After that the charges are waived.

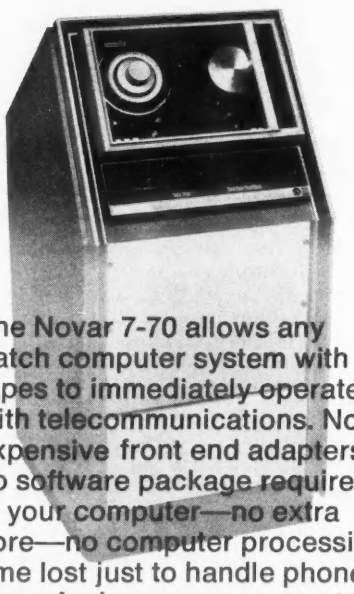
Package Ranks Student Tests

DAYTON, Ohio – Schools using small (12K) Century series CPUs can now extract extensive reviews of individual student performances or assessments of tests, question-by-question, with the Student Test Analysis and Scoring Program, provided free to users by NCR.



The Novar 5-50 and 5-60 terminals prepare both hard copies of business papers and tape copies of the information they contain. The data can be transmitted from tape in the batch mode at any time to a Novar 7-70 Data Collector which records the information on IBM computer compatible tape, ready for processing. It's an immediately available telecommunication system.

GTE INFORMATION SYSTEMS INCORPORATED
2370 Charleston Road
Mountain View, California 94040
(415) 966-2272



The Novar 7-70 allows any batch computer system with tapes to immediately operate with telecommunications. No expensive front end adapters—no software package required in your computer—no extra core—no computer processing time lost just to handle phone lines. And you can save up to $2,000 a month.

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GE's new Mark III. It's time-sharing. It's remote batch. It's a worldwide network.

In fact, it's the world's only integral combination of all three powerful capabilities: the response of interactive time-sharing . . . the economy of remote batch processing . . . the reach of a worldwide communications network.

The interactive time-sharing has new features and controls to make time-sharing more powerful, less expensive, and more easily managed. Yet, it is fully compatible with GE's Mark II, today's most widely used service.

Remote batch processing brings you the economies and power of large-scale data processing. With Mark III, you can save one-half or more of your processing costs just by moving your time-sharing programs into remote batch operation. Yet you still have the ease of use and the service quality that are characteristic of GE time-sharing.

The network is a system that gives local phone call access from over 250 locations in North America and Europe. No matter how you're decentralized, all your locations can share a single system, a single data base. And this information processing network can interact directly with your own computers.

General Electric introduced the first time-sharing service in 1965. In 1970, GE established the first international information processing network. And now, Mark III.

It's time to make a serious comparison of Mark III with whatever information service you now use. Phone 800-638-0971 or write us at 7735 Old Georgetown Rd., Bethesda, Md., 20014. We're ready to help.

291-82A

GENERAL ELECTRIC

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Bits & Pieces

New Tabletop Digitizer Offers ±0.015 Accuracy

ROCKVILLE, Md. – Computer Equipment Corp. is offering users a new digitizer with the entire formatter/readout electronics housed in a compact cabinet for tabletop access.

The Port-A-Grid system offers point digitizing at ±0.015 in. accuracy using a "free" cursor and permits continuous scaling, floating origin and direct decimal readout of scaled X-Y coordinate position, the firm said.

As an option, a formatter/reader interface can be provided to a teleprinter, card punch, CRT or cassette magnetic tape unit. Two sizes are available: 11.25 in. by 15.15 in. (3-1/2 digit plus sign with ±0.015 in. accuracy); and 20 in. by 30 in. (4-1/2 digit plus sign with ±0.030 in. accuracy).

The initial price for the smaller unit interfaced with a card punch is $5,450. The larger unit interfaced with a card punch starts at $6,450. Both units are available from 14616 Southlawn Dr., 20850.

Plotter Doesn't Tie Up Computer

DANBURY, Conn. – Any computer that supports 80-column card output can be used with the TSP-400 plotter from Time Share Peripherals Corp. to produce an off-line plotting system.

Software, supplied by TSP, is used by the computer to generate cards processed by the plotter and produce hard copy with a resolution of 1 in 1,024 in each axis. The advantage of the system is that it can be run off-line and does not tie up the computer during "plot time," the firm said.

The system sells for $5,800, and delivery is from Miry Brook Road, 06810.

Simulator Offered for Maintenance

MINNEAPOLIS – Control Data Corp.'s 9920 Programmable Controller provides off-line simulation of System 360 selector and multiplexer channel input-output sequences for on-site system maintenance and factory checkout.

Priced at $9,800, the unit allows the technician to generate his own checkout programs and store any two such independent programs, each up to 128 10-bit words, on a single 2 in. by 3.5 in. magnetic oxide card.

The unit weights 30 lb and is contained in a watertight aluminum case.

NCR to Service Quantor Gear

DAYTON, Ohio – NCR and Quantor Corp. have agreed that NCR will service Quantor equipment throughout the U.S.

The agreement, beginning in October, will include the total line of Quantor COM and microfiche equipment.

System Flexibility Restricted

Model 125 Doesn't Fit Into 370 Line

By Michael Weinstein
Of the CW Staff

Users who have been awaiting the release of the IBM 370/125 as a breakthrough at the low end of the 370 line are now being offered a machine that meets marketing objectives more than it meets user needs.

The 125 may be directed at bringing the System/3 and 360/20 and 360/22 users into the 370 line, but in so doing it presents problems for the user in system expansion and flexibility.

An ancillary benefit to IBM is the difficulty the 125 will present to users who wish to attach outside vendor units.

IBM, in touting its new system, points to the technological breakthrough of bringing all controllers and selector channels inside in the form of "satellite" subprocessors. Each subprocessor has its own memory, microcoding and direct data path to main memory.

What is not stated is that by using subprocessors the user is being told what peripherals he should have, since each subprocessor has a predefined controller function – e.g., one for disk, one for tape, etc.

For the user who wishes to add other peripherals, IBM offers an optional byte-multiplexer channel which it says connects any IBM or outside unit. But it is questionable how much flexibility the one additional optional channel will afford users in configuring their systems.

During the 1960s, IBM is said to have made oversights when it misread the competition from outside vendors. If true, by integrating controllers and offering users only two choices of memory size – 98K and 131K – the 125 leaves little room for additional oversights.

By forcing users to purchase a minimum of three-quarters of the allowable memory – even if the user chooses the 98K option – only 33K is left for add-on memory. This fact has led the president of Cambridge Memories to assert that IBM is forcing users to purchase a large initial and more expensive amount of memory as insurance against further inroads by outside vendors.

The argument that expansion is unnecessary because of the nature of "virtual machines" still does little to justify the super billing of the 125. By contrasting memory ranges against rental cost for the 360 and 370 models, the 125 is shown to have a limited expansion range compared to other models, and, moreover, it is curiously close to the 135. (see chart)

135 Best?

The two factors of large initial memory purchase and proximity to the 370/135 imply that when users require a larger machine they will be pushed to the 135.

Offering a limited upgrading capability contrasts with the 360 series, where for example, a 360/30 user could start with 8K of memory, and, as his needs increased, add up to 64K of IBM memory – and in some cases 128K using outside vendors – and still keep his Model 30.

Analysis

The proximity to the 135 causes one to wonder to whom the 370/125 will be sold.

Is this going to be the system that IBM uses to upgrade System/3 users? If so, it is a very big upgrade and S/3 users can look forward to entering the DP world with all the frills – DP manager, programmer, cards, tapes, etc. If not, what is the upgrade for S/3 users?

Does IBM intend to "reannounce" the 135 upward to make room for the new system?

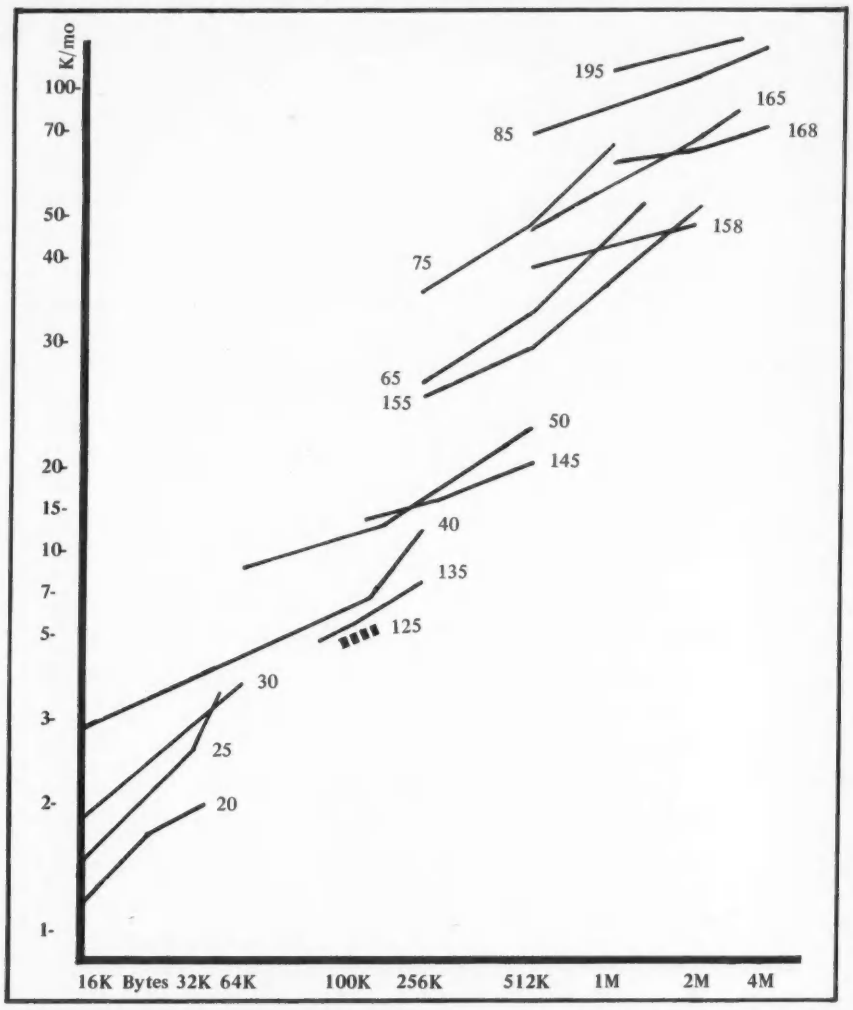
Is the 125 testing user acceptance of integrated subsystems which predetermine the system configuration that a user can assemble?

All these questions arise from the difficulty of seeing exactly where the 125 fits in. If users want a "virtual memory" computer, they can go right to the 135 and completely bypass the 125.

Outside vendors are claiming that IBM used subprocessors not so much to improve system use but to make it harder for the user to avail himself of options in his choice of peripherals.

The user who attaches other than IBM peripherals may run the risk of IBM's refusing to run diagnostics on the subprocessors since IBM may claim it can't be responsible for subprocessor functioning when attached to outside units.

More important than the difficulty of attaching is cost. Outside vendors may have to redesign subsystems and subsystem controllers with lower price tags to compete against IBM peripherals which will easily attach to the 125.



CPU and memory rental plotted against memory size for System 360 and 370 computers. (From EDP Industry Report, Aug. 15, 1972)

the centronics phenomenon:
from zero to $7 million in 484 days.

March 14, 1971: our first printer came off the assembly line.

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GE's new Mark III can cut your time-sharing costs by a third

What we're offering is not a miracle, but a new approach to information processing: Mark III. It's a single, unified service that combines the response of interactive time-sharing, the economy of remote batch processing, and the reach of a worldwide communications network.

Your total savings depend on your own applications, but our estimate of one-third may be conservative. For example, with Mark III you can save one-half or more of your processing costs just by moving your time-sharing programs into remote batch operation. In addition, Mark III includes new time-sharing capabilities that can lower your costs dramatically. To tie it all together, a new budget allocation and control system helps you get the most out of each computing dollar.

General Electric introduced the first time-sharing service in 1965. In 1970, GE established the first international information processing network linking over 250 locations in North America and Europe.

And now Mark III—an integrated network of nearly 100 interconnected computers. With a network this size, each computer performs that task for which it's best suited—communications, interactive time-sharing, or batch processing. The result is a service that can tackle your computing needs easily, reliably . . . and, most important, economically.

If you're a Mark II user, Mark III offers major new features and is fully compatible. If you're not, it's time to make a serious comparison of Mark III with whatever information service you now use. Phone 800-638-0971 or write us at 7735 Old Georgetown Rd., Bethesda, Md., 20014. We're ready to help.

291-83A

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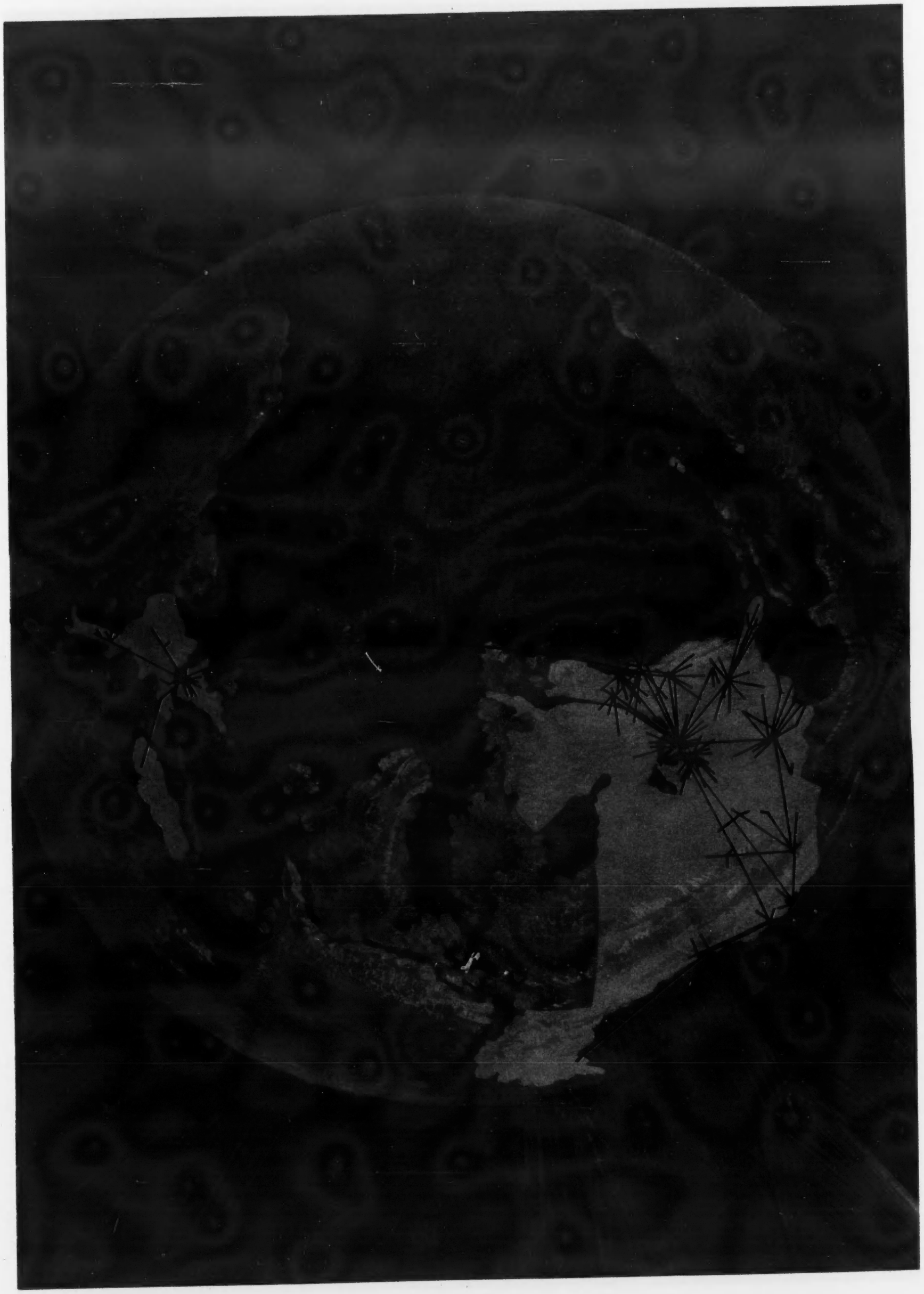

GE's new Mark III lets you create a worldwide order processing network.

Immediately.

Computerized order entry systems are not new. What is new is a complete service that requires no capital investment. A service with local phone access available from hundreds of international locations. A service whose cost is proportional to your use.

It's called Mark III, and it's ready to become your order processing network starting today.

You can tie together your sales office, factories, and warehouses to enter orders and fill them. Many companies are already using this network. Their businesses range from food processing . . . to auto manufacturing . . . to insurance services . . . to chemical production.

Salesmen can instantly verify inventory status, check buyers' credit, place orders, and mortgage inventory. Capturing the order information in a single data base also opens up other valuable management uses, such as sales control and forecasting.

Mark III is an integrated network of nearly 100 computers, interconnected and accessible from over 250 cities in North America and Europe. This international network has been used commercially since 1970—and it is ready for you right now.

If you use GE's Mark II, Mark III offers major new features and is fully compatible. There's much more to this exciting new opportunity. For the facts, phone 800-638-0971 or write us at 7735 Old Georgetown Rd., Bethesda, Md., 20014. We're ready to help.

291-85A

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OCR Uses Laser Scanning To Increase Read Accuracy

CHICAGO – North American Rockwell has entered the OCR market with a low-cost page reader that promises enhanced operation with technology learned during the Apollo space program.

The Metro-Reader offers a reliability of less than one error for every 10K characters read, the firm said. "This reliability is possible through the use of a laser-scanning device," a spokesman added. "Lasers are simpler in operation, with less moving parts, and are more reliable than electromechanical devices used in most OCRs."

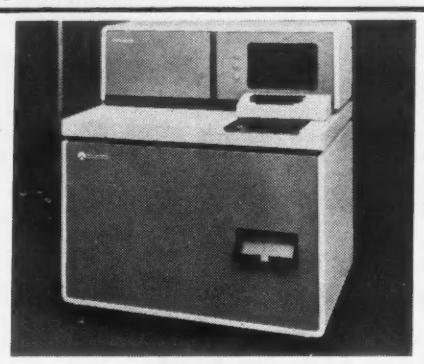
Typewriter Input

Input to the Metro-Reader comes from standard electric typewriters equipped with an OCR-A or other predetermined font. Corrections can be made by typewriter on original copy either by using a delete character or striking out material and replacing it with typed changes just below the line. The reader replaces the old material and opens or closes the space.

The $60,000 system (most OCR units range from $40,000 to $900,000) comes with an optional CRT to display any character the OCR cannot recognize. The unrecognizable character is displayed on the screen so an operator can enter the correct character from the keyboard.

Range of Paper Sizes

The unit handles a wide range of paper sizes and can read up to 75 char./line, 10 char./in. The Metro-Reader will process any interline spacing greater than .070 in. at a peak recognition rate of 120 char./sec. Operationally, the OCR unit has a 90 char./sec. throughput rate – which corresponds to a 900 word/min. rate.



Metro-Reader

The character recognition speed is 120 char./sec. (OCR range is 60 char./sec. to 4K char./sec.) and output is normally in the form of punched tape (although the system can be reconfigured for on-line transmission).

The unit, developed in conjunction with Cognitronics, Inc., will be sold through MGD Graphics Systems – subsidiary of North American Rockwell. Deliveries are expected from early next year from 3100 S. Central Ave., 60650.

Mohawk Readers Read Mark-Sense Or Punched Data

KING OF PRUSSIA, Pa. – Two card readers that can read mark-sense and punched cards on the same pass have been introduced by Mohawk Data Sciences Inc.

The model 6028 reads cards prepared in the IBM format (80 punched columns and 27 marked columns). The 6029 reads cards with a pre-printed timing track (80 columns for punched or marked data). Either unit can be ordered from the manufacturer to read cards face-down or face-up at a rate of 225 or 400 cards/min. in bit-parallel, card image format.

Each card passes through a photoelectric read station where a light source is directed at the card. In the case of punched cards, punches are determined by the light passing through and being registered by a sensor on the other side. Mark-sense cards are read by a channel sensor. There are 12 sensors, one for each row on a standard card.

As each position passes the sensor it is checked to determine if there is a variance between a mark and the blank surrounding area. Marks can be made with any pen, pencil, etc. that darkens the area to be scanned. The light source technique "produces a uniform output over a wide range of conditions, making the performance of new units independent of aging, high or low voltage, or temperature changes," a spokesman said.

Both models incorporate detection facilities for punched and marked data, automatic function checking, and leading-edge card detection. Errors are indicated on a control panel which carries four error indicators to identity a stop condition or indicate invalid data: pick failure, motion failure, invalid variance, and validity check.

Single unit price for the 6028 is $3,575 and for the 6029 $3,425. Additionally, volume discounts are available from 781 Third Ave., 19406.

Memorex Disk Feature Allows Users to Add Four Disk Modules

SANTA CLARA, Calif. – Memorex has an 8-module feature for its 3670 Disk Storage Subsystem which "effectively matches the only additional capability included in IBM's announced repackaging of their 3330 disk system," according to the firm.

The basic Memorex 3671 Storage Control Unit for the 3670 can attach up to four 3670 disk storage modules – two spindles for each module – and can manage up to eight channel programs – one for each attached spindle.

The attachment feature for the 3671 allows the user to attach up to four additional 3670 disk storage modules, for a maximum of 16 spindles. Included are an additional power distribution unit and hardware and microcode changes to address and control the additional spindles.

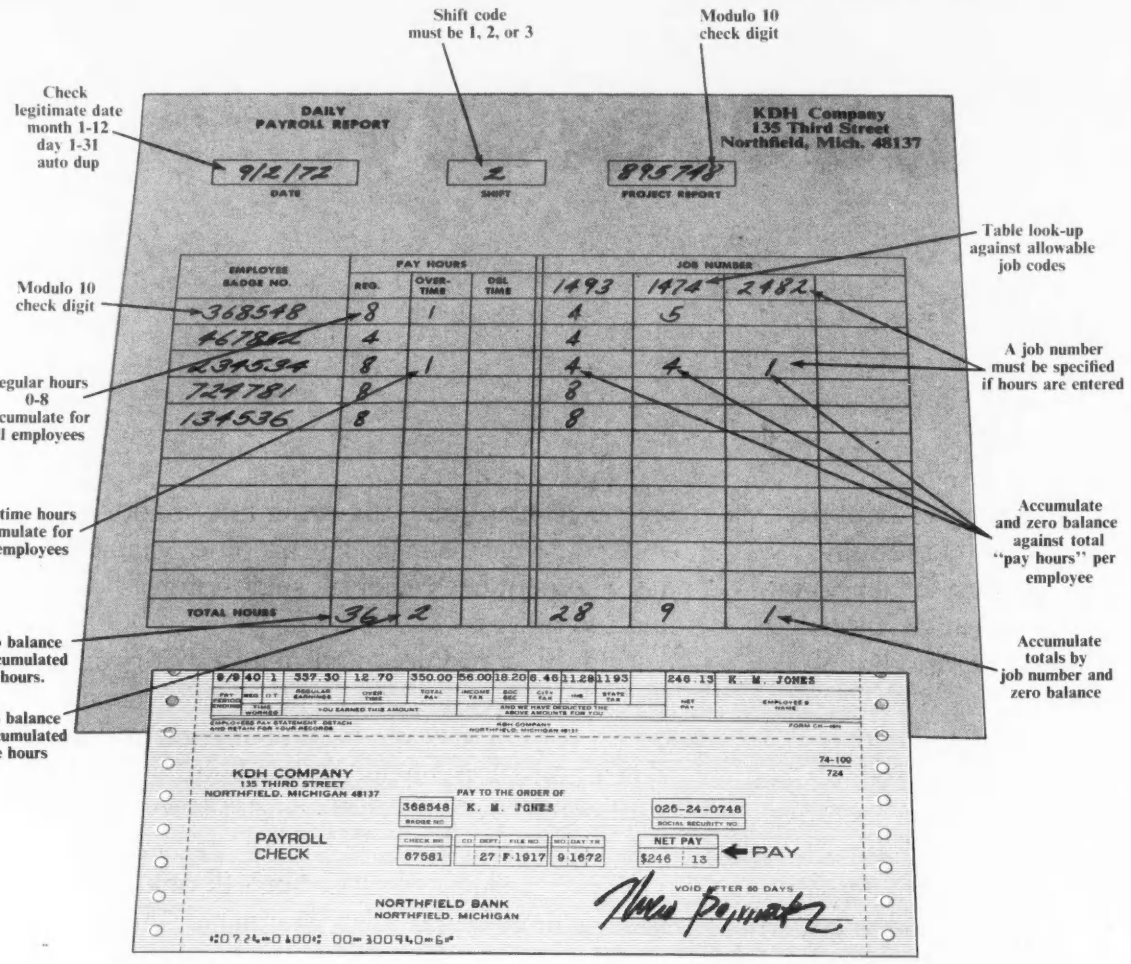
The 8-module attachment feature is field installable, does not require changes to the 3670 disk drive modules and does not require additional floor space.

The Memorex feature is more flexible than the equivalent IBM equipment, according to the firm. "For example, the IBM feature requires the installation of at least one additional unit – the 3333 – while the Memorex feature is field installable within the existing 3671 storage control unit; . . . also, the IBM feature represents a much greater increase in weight and heat," the firm added.

The attachment feature will be available for new 3671 control units and for field installation for older models in the second quarter of 1973.

Lease prices for the attachment feature on a three-year lease are $270/mo. and $1,825 for the 3671 controller from San Thomas at Central Expressway, 95052.

REMOTE PAYROLL ENTRY AND CHECK-PRINTING FROM SYCOR.



If you're responsible for getting payroll checks to remote locations, you know how important it is that they be delivered on time. Sycor's Model 340 Intelligent Communications Terminal now frees you from the nagging concern that a payroll might be delivered late.

Payroll report data *can be captured at remote locations* on the Sycor 340, where it is automatically checked and edited for accuracy. At the push of a button, the 340 transmits the data at high speeds over the public switched telephone network to a CPU using sophisticated binary synchronous procedures to assure that no data is lost and no erroneous data is received. The processed data then can be sent back, unattended, for printing of payroll checks *at the site* via any of three types of dependable Sycor printers (30 cps, 165 cps and 200 lpm).

As a result, your payroll is prepared quickly, economically and accurately; your employees are paid on time; and you stop worrying.

The Sycor 340 can do this job, and most any other you might have, because Sycor provides users with T.A.L. (Terminal Application Language). With T.A.L. you can write sophisticated programs tailored to your own terminal applications for execution in an optional one microsecond terminal memory.

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The Sycor 340 Intelligent Communications Terminal.

COMPUTERWORLD

CW SPECIAL REPORT

★ Getting Out the Output ★

Most Users Favor Cluster CRTs To Replace Teletypewriters

• Get the Data on the Tube
• Read and Edit It Quickly
• Use Hard Copy Selectively

While the widely used teletypewriter is still the most cost-effective output device, the CRT terminal is rapidly closing the gap.

The user operating in an interactive environment has traditionally utilized the TTY because it was considered the best terminal available. But today's cluster CRT system offers the operator the advantage of speeding his data retrieval out of CPU storage.

"Anyone that really needs paper in volume doesn't want a slow-speed terminal to print out his copies at 10 char./sec," according to Bill Steinmetz, manager of customer education and promotion at Four Phase Systems, Inc. "But if he doesn't need volume printing, he probably doesn't need a local printer at all," Steinmetz said.

Significant Advantages

With the cluster CRT system and a built-in processor, the user gets some significant advantages that would be impossible with the teletypewriter, Steinmetz said. One of the most useful traits of the CRT display is its ease of editing, he said. With the TTY, the only way to change the copy is to retype the information, which usually means printing out a block of data up to the point of the change and then typing in the modifications.

But on the CRT the editing can be done directly from the keyboard to the screen. There is no need to wait for time-consuming printouts to see the full revised copy.

In a management information system application, Steinmetz said, the CRT also is better than the teleprinter. "If you are looking for some information and the alternative is searching through a foot-high pile of printouts compared to using the tube to selectively go into the same file with built-in search constraints," there is really no comparison, Steinmetz said.

"Once the data is on the tube, you can read it quickly, manipulate it and rearrange it if necessary. If after all that, you really need to print it out, you should have access to a print control key on the terminal that will activate a master printer."

But this selective hard-copying of some data is a far cry from depending on a teletypewriter as the only way to receive data from the CPU, Steinmetz said.

Cost Difference

In the cost per terminal, the difference that once existed between TTYs and CRTs is rapidly diminishing. "If you compare a display that can accept data at 1,200 bit/sec, it really can't be compared directly with a teleprinter that accepts data at 300 bit/sec," according to Russ Doane, manager of alphanumeric CRT development at Digital Equipment Corp.

But if a display supplier were to begin manufacturing CRTs in volume just like teletypewriters, then the CRT would probably be cheaper, Doane said.

Steinmetz said a more direct comparison between the two types of terminals can be made. "In our data entry system with 22 terminals and the computer, the cost per station is under $100/mo." On a one-year lease, he said, this compares with about $75/mo for a teletypewriter.

But the $25/mo difference does not reflect the added capabilities of a CRT operator to cut down on the time to process a given record of data.

"We can pour data into that tube a lot faster than anybody can read it. We can scroll, roll, page through a file randomly or in sequence," he said. And all the CRT advantages make the user's operation more efficient, Steinmetz thinks.

"If the user doesn't need one of the things that only paper can do," such as the hard copy, portability, etc., then the user should get a CRT because it is "simpler to use, quicker and actually cheaper than the printer," Doane said.

From an operational standpoint, the CRT is an easier device to maintain. The teletypewriter is an electromechanical device that is costly to keep running, while the CRT is electronic and generally more reliable, according to industry observers.

One of the current drawbacks to the use of CRTs is psychological, according to Dave Beaber, a staff consultant at Arthur D. Little.

Many managers keep enormous reports on their desks strictly from habit and perhaps partially because they really don't trust a CPU well enough to operate interactively with a CRT terminal. "There is a general distrust of the on-line computer," Beaber said.

But IBM with its virtual systems has made the on-line system with its large easily accessible data base more economical for the user. And this will lead to greater use of on-line terminals such as the CRT, Beaber said.

Ultimate Solution

The ultimate solution to the CRT/TTY trade-off will probably be a display terminal with access to a printer in a shared mode with other CRTs. In this type of system, the hard copy will be the exception rather than the rule.

Even the company that started it all, the Teletype Corp., sees the shift toward display terminals. The firm is known to be experimenting with "soft printing" devices that will include a display.

Today the price of the TTY is still the overriding factor in the selection of a terminal. But as the CRT drops in price, users will begin to look at a terminal as a tool to implement an application. When that happens, the CRT will become more useful in most interactive environments.

Innovation Cuts Output Glut

In order to make full use of a CPU's processing capabilities the user must have efficient output methods. While the on-line impact printer is still the industry standard, innovative users are looking at some different methods.

Desktop plotters are gaining in graphic representations associated with management systems. CRTs can replace the teletypewriter in some applications. And the most enlightening change of all for the DP user is computer-output-microfilm (COM).

The answer to efficient output is probably geared to the user's specific needs. But innovation is the watchword, and the vendor can no longer assume his printer will fill all the user's output needs. In many cases there will be more to meet the eye.

Printing Problems Solved With Microfilm

Most DP users become involved with computer-output-microfilm when their printing loads become too great. Many installations depend on regular outputs of voluminous data that must be laboriously printed out by IBM 1403s or similar devices.

For this user the first alternative is probably off-line printing. The advantages include lessened impact on CPU time since the off-line systems run from a print tape prepared on the mainframe at a much faster rate than the on-line printer. But even the off-line system is still basically a mirror image of the conventional printing routine. The physical time required to print a given amount of data remains constant, as do the paper costs.

Another alternative for an in-

"To rent our own COM system and buy the materials would cost us about the same as we are paying the service bureau. There are no savings involved so I'd just as soon let someone else do the work." – a COM user

stallation with an output jam may be COM.

"It was getting to the point where there weren't enough hours to print our reports," is how John Robinson described the output glut at his installation. Robinson is DP manager at Associated Franciscan Health Services Inc., a service bureau providing facilities to seven local hospitals in the Cincinnati area.

Each weekend Associated was printing a status report for its customers that was about 2,200 printed pages and took about two hours to print. "We were sending three cartons of paper to a hospital each weekend," when a report was finished, Robinson said.

Robinson decided to switch to microfiche to solve his printing problems. But instead of installing a COM system in-house, he went to a service bureau. After some careful cost analysis, he concluded that the outside fiche operation was costing him about the same as the large printing load which he previously had to push through his 1403 N1, operating with Associated's 370/145.

"We were able to justify the COM on paper costs alone," Robinson said. "We were paying $23.45 for four-part paper per 1,000 sheets. And the COM originals with the duplicates cost about the same per thousand frames."

Asked whether he had considered an in-house COM system, Robinson said, "to rent our own COM system and buy the materials would cost us about the same as we are paying the service bureau. There are no savings involved so I'd just as soon let someone else do the work."

One important consideration for Robinson was the operation of two COM service bureaus in the area, each running Stromberg Datagraphix systems. Although he did not say so, the availability of two outside sources for COM was probably a safety factor that justified taking the plunge into microfiche.

Associated gives its hospital customers a choice of either paper or fiche output, and up to now they have all chosen fiche, Robinson said. One of the major benefits from COM is the savings in CPU time. When the status reports were run on the 1403 with the 145, a report took several hours. Now it takes about 20 minutes to generate a print tape, Robinson said.

The tape is picked up by the service bureau, processed, duplicates printed and the entire job is usually back the same day, according to Robinson.

Asked whether he would consider an in-house COM system in the future, Robinson said, "we run about 100,000 frame/mo, and that is about the break even point between using a service bureau and doing your output jobs in-house.

"If our workload were to increase significantly, we would have to consider getting our own system." But for now, Robinson doesn't want his computer operators to become photographic technicians, especially when there are no savings involved.

"We have the volume to justify developing a COM application," Robinson said, "and we also have the ongoing volume of accounts and transactions."

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How to Pick Best Reader

By Alonzo J. Sherman
Special to Computerworld

This article intends to help those who must select the most suitable microfilm reader or reader-printer (RRP) for their specific application. Only conventional RRPs in the 10x to 45x magnification range are included in the article; the automated microfilm retrieval systems are excluded.

The value of the selection technique outlined in this article is that it simplifies and shortens the RRP selection process and greatly increases the probability of selecting the most suitable RRP.

There are currently over 100 basic COM readers or reader-printers from which to choose. Some of these are foreign made, but most are U.S. products. Of these 100 basic RRPs, 59 can handle only one microform (e.g. cartridge, roll, microfiche or aperture card); 21 can handle two; 14, three; and six can handle all four microforms.

This multiple microform capability allows the selection from 60 models with microfiche capability, 45 with roll, 35 with aperture card and 30 with cartridge capability.

7-Step Procedure

In collecting the data to perform the RRP selection, the user will find the requirements data (chart 1) must come from hard soul searching within his own organization, and it must be directly based on the function he is trying to accomplish by using microfilm.

The other data comes from outside the user organization, i.e. specifications (chart 2) and evaluations (chart 3).

This data will be obtained from vendor brochures and sales representatives' equipment directories, magazine and journal articles and from users of the equipment.

Once the requirements are identified, (chart 1) the user can begin working with the specification data (chart 2). At this point he can quite readily eliminate those RRPs which do not have the required specifications. He will be left with a smaller group of candidate RRPs which meet the required specifications. At this point he can begin considering the relative merits of quality based on evaluations (chart 3).

The selection of an RRP is outlined in a 7-step procedure (chart 4), which should be followed step by step to obtain the best results.

Following are the basic requirements which need to be determined prior to selection of an RRP. These must be determined for each microform to be used. Some requirements or microforms may not be applicable to the situation.

Printer

- Prints must be (e.g. low cost, high-speed, high resolution, dry, etc.)
- Amount of prints made vs. number of times RRP is used (e.g. < 5%, > 5%, 10%, 25%, 50%, 75%, 100%).

Reduction Ratio(s) of Film

- (e.g. 15, 16-20, 24, 32, 42, etc.)

Image Orientation(s)

- Comic (e.g. side by side on roll film)
- Cine (e.g. top to bottom on roll film) • Etc.

Screen Size

- Engineering drawings (18 in. by 24 in. horizontal) or larger
- Computer lists (11 in. by 13 in. horizontal)
- Double document pages (11 in. by 18 in. horizontal)
- Single document page (9 in. by 11 in. vertical) • Etc.

Scan Control (Cartridge & roll applications; allows image to be moved in opposite direction of film movement)

Physical Size

- Portable (handle or case etc.)
- Desk-top use
- Overall size (cu ft)
- 12 V, 110 V or both
- Lap or handheld models
- Size of base on desk (sq ft)
- Etc.

Required Number(s) of RRPs by Usage Group

- Every 10 min. or more often
- Every hour
- Every day
- Every week
- Less than weekly

Retrieval Time

Ave < 5 sec., 5 to 15 sec., 15 to 30 sec., 30 to 60 sec., 60 to 120 sec., over 120 sec.

Approximate Cost Limit of RRP

- $4,000 or higher, < $4,000, < $3,000, < $2,000, < $1,000, < $500, < $300, < $200, < $100, <$50.

RRP Basic Functions

- What significance do you place on each of the basic functions of image location, screen readability, print readability?

(e.g. Use VH, H, MH, ML, L or VL, where V=very, H=high, M=medium, L=low).

RRP Ease & Convenience

- What significance do you place on each of the ease and convenience factors? (Use e.g. VH, H, MH, ML, L or VL)

Film loading; film movement, motorized; film movement, manual; image orientation; image centering; scan control; focus control; focus retention; printing; and changing magnifications.

Your unique requirements, if any, should also be included.

Chart 1. Requirements

Following are the basic evaluations which need to be determined prior to selection of an RRP. These need to be determined for each microfrom to be used. Some evaluations or microforms may not be applicable to the situation.

The scheme suggested is to use a numeric expression of value (as illustrated below), and assign this to each basic function and ease and convenience factor.

1 – Very Poor 3 – Fairly Poor 5 – Good
2 – Poor 4 – Fairly Good 6 – Very Good

Basic Functions – finding the image; readability of image; and readability of print.

Ease and Convenience Factors – film loading; film movement, motorized; film movement, manual; image orientation; image centering; scan control; focus control; focus retention; printing; and changing magnifications.

Chart 3. Evaluations

Following are the basic specifications needed for each RRP model prior to selection. These must be determined for each microform to be used. Some specifications and microforms may not be applicable to the specific situation.

Film Loading and Image Location

- Film size (e.g. 16mm or 35 mm roll; 3x5, 4x6, 5x8, or 3¼x 7-3/8 microfiche, aperture card, etc.)
- Cartridge type (e.g. 3M, Kodak, Memorex, etc.)
- Image location (e.g. eyeball, odometer, blip control, etc. for roll and cartridge; and martrix, dial or strips for microfiche)
- Threading (e.g. manual, semi-automatic, automatic, etc.)
- Film movement (manual, motorized or both)
- Scan control
- Ability and time to change from one specific microform to another.

Optics

- Screen size
- Image rotation (e.g. 90°, 180°, 270° or 360° and how accomplished – prism, turret, turning RRP on side; or e.g. on microfiche – by taking out the firm, turning and reinserting it and relocating the image.)
- Lens sizes (e.g. 20x, 24x, 30x, 42x, etc.)
- Lens changing (time and method of accomplishment)
- Type of projection (rear of screen, wall, desk-top, etc.)
- Illumination levels (e.g. on-off, hi-low-med., etc.).

Prints

- Size of paper and ability of size selection from use to use
- Print delivery (e.g. cut from roll, precut or torn manually from roll)
- Print time (for one print, and for continuous numbers of prints, e.g. 25 sec. – 1st print, four per 60 sec. for multiple copies)
- Polarity (positive or negative) – reversed, print is always opposite of film; negative or positive film to positive print by change of tones only; negative or positive film to positive print by turning switch
- Cost (e.g. 5 cent for 9 in. by 11 in.)
- Type (e.g. electrostatic, photographic, dry silver, electrochemical, etc.).

Physical Characteristics

- Weight
- Dimensions (height, width, depth; and sq ft of base and cu ft of total RRP)
- Uses (e.g. lap reader, desk-top or console)
- Portability (e.g. handle, carrying case, etc.)
- Power Source (e.g. 110 V, 12 V or combination).

Cost

- Basic costs of manual and motorized reader and reader-printer, and cost of options (e.g. extra lenses, film carriers, carrying case, bright light sources, etc.).

Chart 2. Specifications

Many interrelated aspects enter into the selection of an RRP. In order to make the selection as simple as possible and in the shortest time possible and with the greatest possibility of a good selection, the following seven steps have been developed.

In summary, and in order of accomplishment, they are to define your requirements data (chart 1), obtain RRP specifications data (chart 2), obtain RRP evaluation data (chart 3) and then use an orderly manner of applying this data (chart 4).

Step 1, Data Collection – Obtain data outlined in charts 1, 2 and 3.

Step 2, Selection by Specification – By comparing the RRP specifications (chart 2), against your requirements (chart 1), select all RRPs which match.

Step 3, Review Evaluations – Review all evaluations you have accumulated on each RRP selected above (chart 3). Prepare a list putting the better RRPs on top and the poor ones on the bottom.

Step 4, Selection of Several Candidate RRPs for Demonstration – Select a group of RRPs from the top of the above list. How many RRPs you select is pretty much up to you. Arrange with the vendors for a demonstration.

Step 5, Demonstration – Observe vendor demonstration, validate specifications, make your own evaluations on the functional and ease and convenience factors, as well as the vendor's support. Be sure to take along at lease one clerk in your organization who will actually be using the RRPs.

Step 6, In-House Ad Hoc Group Review – In your office review your findings to this point. Be sure to include the clerk from Step 5. You may find that you can logically eliminate several RRPs. Eliminate these.

If you feel it is profitable to go farther down the list from which your selection was made in Step 4, do so, and repeat Step 5 for those additional candidates. If you feel that an in-house test period would help your selection, request the vendors to furnish a loaner for a week or so, and continue your review and evaluation of the RRPs.

Step 7, Selection of One RRP – Now take all RRPs demonstrated in Step 5, and not eliminated by review in Step 6, and as a group in your office, discuss each in detail and determine the most suitable RRP for your requirement.

Alonzo J. Sherman is a micrographics consultant. He is the author of a book on microfilm readers and reader-printers.

Chart 4. Selection Procedure

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In-House Versus Outside Trade-Off Vital to COM User

The user who considers computer output microfilm (COM) to alleviate his printing logjam must make several additional trade-offs before he finds a system best suited for his needs.

The selection of a COM system contains three basic considerations, according to Donald Kelley, COM product manager at Memorex. First, the user must decide what type of microfilm storage he will use; second, he must choose between in-house and outside systems; and finally he has to consider whether to operate on-line or off-line.

COM storage is available in cartridge, microfiche, roll film and cassette. Roll film is relatively slow to use because it must be manually mounted and "dismounted" by the operator.

In addition, roll microfilm has to be accessed sequentially, and this can be time-consuming when searching for a specific record, according to Kelley. The cartridge is easier to mount since it is usually self-threading, but still requires some manual handling.

The cassette requires no threading and has an added convenience of remaining at the same frame when taken off a COM viewer. Other 16mm roll storage methods require rewinding, which means that each time a record is accessed, it must be relocated on the file.

The one method that provides some different advantages is microfiche. Although it is easy to handle, Kelley compared fiche with unit record equipment because it is difficult to store in a preset sequence.

'Extensive' Software

In order to adequately index a microfiche system, the user must add programming changes to his CPU, according to Kelley. He described this software effort as "extensive."

One heavy COM user who disagrees is Bill Meyer, vice-president of Computer Micromation Systems Inc. Meyer's firm, a COM service bureau operation, services customers within a 100 mile radius of Cincinnati.

The indexing associated with microfiche is furnished as part of the service bureau operation, Meyer said. And even though fiche requires some software to implement the indexing capability, almost all customers use this type of film output compared with roll methods, he said.

"With roll film the user is talking about a slower, less direct look-up method," Meyer said. And the readers for roll film are usually higher priced than the fiche type, he said. The indexing software can require some changes, but this software is usually set up for one application with few subsequent changes, Meyer said.

"We have two ways the user can go with his fiche indexing software," Meyer said. First, the user can take a standard print-image tape that basically includes a carriage control character and a print line written on tape together with the number of records required for a report. That tape is then run through an indexing program.

The only other thing the user has to add are parameter cards that indicate where to extract indexing data. So the user will have an account number that appears on every page in the same location and can be used as the indexing key, he said.

This information is then entered on a control card which is built into a table that is "dumped" as the last page of the fiche, he said. This process requires a print-image tape, which is then processed tape to tape, but it requires "no front-end software development," Meyer said.

The second approach makes use of software subroutines which can be entered into a users's program with some "relatively simple" software modifications. The service bureau has these subroutines in both Cobol and Assembler language, Meyer said.

On-Line Preferred

In choosing between an in-house or outside COM operation, Kelley said the user can process his jobs "10 times faster" than printing by using an on-line system. An off-line system requires a technician to run it while an on-line COM runs just like a "standard peripheral," he said.

But the number of available on-line systems is still small, according to Meyer. Most of the COM processed today is "far and away" off-line, he said. One big on-line advantage, according to Kelley, is the one-pass method, while off-line COM requires two passes – once to generate the print tape and the second to generate the film.

Another disadvantage of off-line systems, according to Kelley, is that they are more costly to run than on-line COMs. An off-line system can cost about $2,000/mo while an on-line system from Memorex costs the user less than $900/mo, he said.

But Meyer said these figures are probably not the entire cost to the user. "If your end objective is just the production of data on film, then the on-line method is better." But a complete system including the flexibility of making duplicates and cost of materials is usually more economical operating off-line, he said. "We average 3.5 duplicates per job," Meyer said.

The break-even point at which a user can switch from an outside service bureau operation to an in-house system is about 50,000 page/mo. At this level,

(Continued on S/Page 4)

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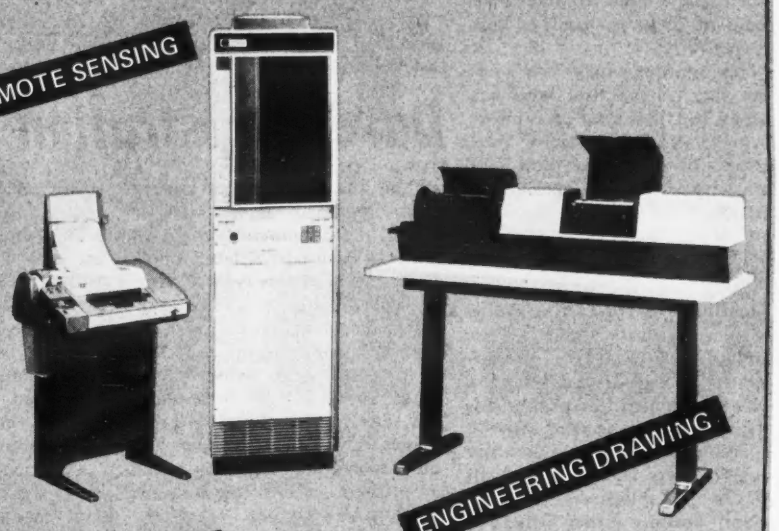

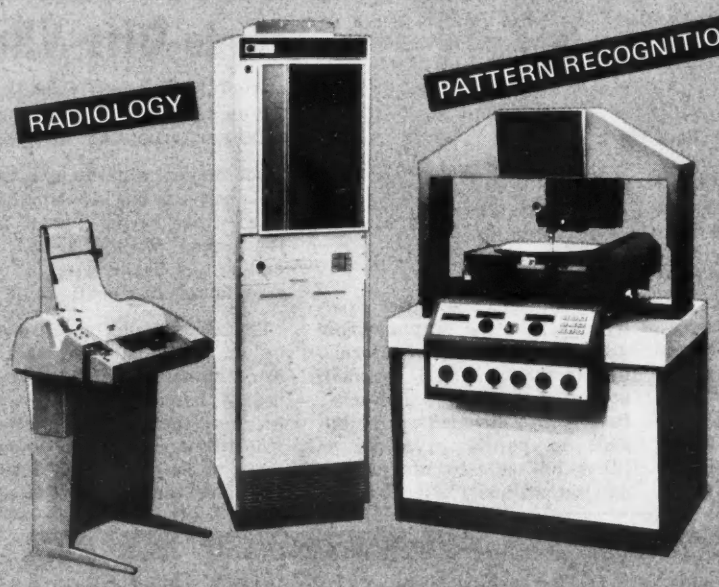

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Spoolers May Help Solve I/O Problems

By Don Leavitt
Of the CW Staff

Installations still using DOS/360 for business-oriented DP often find themselves with heavily I/O-bound workloads – the reading in of a month's transactions on cards, the printing of statements for each customer on the file, or the punching of turnaround documents for inventory control. Shifting to faster hardware, or to an OS/360 environment to handle more jobs concurrently might seem to be the solution but this isn't necessarily the case.

The problem lies in the relatively slow speed of the "unit record" I/O devices. The solution may in fact lie in one of the currently available spooling packages, which separate the application program from the I/O gear, but it may take a real effort for a user to determine which of these packages is best for him.

(This problem may not concern the Univac user who has always had this kind of support through various "symbiont" processors, or the Honeywell 200 user who is used to data transcription routines as a standard part of his operating system – but the DOS/360 user has no such support within his system.)

Spooling generally refers to the use of a disk as an intermediate storage device, between the application program and the card reader, punch or line printer. By setting up a high-speed storage capability, spoolers allow the programs to operate – for all intents and purposes – at processor speed, rather than at peripheral speed.

There are two basic types of spoolers in terms of how they collect the data coming from or going to the I/O devices, but there are also two basic types in terms of how they function once the data is collected. And the two pairs of definitions do not necessarily coincide.

Almost all of the spoolers bring card image input onto a disk for later accessing by the using program. (The Sprint package from Jason Data Service allows the use of tape as an alternative to disk, but that is an exception to the normal offering.) In any case, it is not on the input side of spooling that the differences appear.

One type of output spooler shifts all data to a disk work file, while the other type uses core-resident buffers to store as many I/O records as possible, and moves only the excess to disk.

Usually, but not always, the type that puts all records out on disk produces no printed reports or punched cards until after the generating program has completed its run. The output is then created under utility-type control, shifting data from disk to printer and/or punch as appropriate.

The spoolers that utilize in-core buffers can shift the records to the I/O devices as soon as they become available, even while the generating program is still executing. Under this plan, the disk-stored records are retrieved and then passed over to the output device as soon as the core buffers are emptied.

The spoolers that put all I/O on disk probably allow the fastest execution time of the generating program, since there is no logic within the spooling routine to determine, for example, whether the record can stay in core or has to be put out on disk. But they will require time later for the actual production of the punched cards or printed reports.

(Continued on S/Page 5)

Package	Vendor	Core Requirements Logic	Buffers	Output Process Mode	Cost	Partition	Remarks
Grasp	Software Design Inc.	4K (Plus 2K for each device)	Yes	Asynchronous But Overlaps Generating Application Programs	$7,500	Yes	May Be Located in F0, F1 or F2. User Routines Can Be Attached To Run in Grasp's Partition
Asap	Universal Software	2.5K	Yes		$3,500	No	Requires IBM's Multiprogramming Support
Sprint	Jason Data Services	4K-12K	Yes		$2,200	(Yes)	May Be in F1, F2 or Upper Core. Requires Multiprogramming
DSS	Continental Systems Associates	10K	No	Follows End of Generating Program: May Overlap Next Program	$6,900	Yes	
Power II	IBM	18K Minimum	No		Free	Yes	Type III Program, Has Class A Support
Powerpak	Johnson Systems	32K	Yes		$20,000	Yes	Not Being Actively Marketed Handles Job Setup and Tape I/O Uses Logic of Power for Spooling

Summary of Available Spooling Packages

Data Registration Critical When Copy Input to Scanner

While the CPU printer is generally regarded as an output device, the documents generated can also be used for later input. The printing of this type of turnaround document poses some special problems for the printer.

When using printed copy for later input to an optical mark sense, or other type of scanner, the registration of the data becomes critical. The scanner can only recognize information that is printed within the box, or field, to be scanned.

The type of printer that can be used to generate a turnaround document is open to question. "Our requirements for scanning printed data fall well within the specs of most drum or chain printers," according to a spokesman for Cummins Chicago Corp., which makes scanners. The company presently has about 60 customers which use scanners for printer-generated documents.

But at least one user disagrees. "I would not like to use a drum printer to generate a document that had to be scanned later," cautioned Webster Hunt, programmer analyst for the Winter Park Telephone Co.

The phone company has virtually eliminated its billing keypunch department by using turnaround documents generated on an IBM 1403 N1 printer. Previously, bill payments that were received at the phone company had to be keypunched for input to the utility's 360/20. This meant bill payments could be processed on the CPU only as fast as the keypunch operators could prepare the data for input.

The key to the operation is a specially coded section of the customer's phone bill generated by the 1403 printer. Using an "all ones code" on which Cummins Chicago holds a methods patent, the bill stub returned with payment by the customer contains a matrix of "ones" which is later read by the scanner and translated into the phone number and dollar amount paid.

Parity Check

The coding method uses a parity check so the customer cannot add or change the information in the field to be scanned, according to Hunt. A mark-sense field is also included on the bill stub so partial payments or other bill adjustments can be entered manually after the customer sends in his payment. The manual field can also be scanned.

Vertical Registration

One critical area in the printing process where errors can occur is the vertical registration, according to a Cummins spokesman. But this does not seem to be a problem at the Winter Park billing center. The phone company is experiencing a .5% error rate on the printed documents that are scanned, according to Hunt.

The choice of the number "one" in the Cummins code was no accident. Regardless of the print font being used, the "one" is formed similarly and can be recognized by the scanner. This means that as long as the user has a clearly printed number, it can be fed into the scanner.

One important point for the user to remember is a black ribbon that prints a dark character

(Continued on S/Page 6)

Trade-Offs Vital to COM User

(Continued from S/Page 3)

the user has a COM bill of about $800/mo, according to Kelley.

But Meyer said the user continuously on-line is running a risk by not having a print tape for backup. Without a tape, the on-line user has to rerun his program in case of a malfunction.

The trade-offs to be considered by the potential COM user are often complex. The answers are usually based on the characteristics of the user's application. And the service bureau does not seem to be an interim step for the COM user. Most of Meyer's customers stay with an outside service.

The main problem apparently is based on a lack of education. The DP manager still regards a COM system as a foreign technology intruding on his domain. Even when he is convinced there are cost justifications for using COM instead of printing, he will leave the mechanics of the operation to outside experts.

Regardless of whether the COM is running on-site or elsewhere, the user who switches to filmed output usually enjoys faster throughput and possible cost savings.

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MIS Most Promising

Desktop Plotter Use Growing in Business Environment

While most users consider a desktop plotter to be a scientifically oriented device lending itself to engineering and similar technical applications, more and more of the devices are turning up in business environments.

The most promising area where plotters are expected to make significant inroads is the management information system. As executives expand their computer usage, to aid them in making business decisions, the desktop plotter will grow in importance.

The businessman who now calls on a CPU printout with a list of numbers describing a trend will be able to plot the relative values of the numbers, to picture the trend graphically.

One manufacturer with a desktop plotter line for about two years is Hewlett-Packard. The 7200 Series comes in models for both on-line and off-line operations. The 7210A, which operates on-line with the company's CPUs, can plot up to 20 coordinate/sec and up to 5 symbol/sec. The unit can plot coordinates relative to other points or it can plot in absolute positions defined within a preset matrix.

Another HP plotter in the series is plug-compatible with most major communications terminals and connects on the EIA level to turn the remote terminal into a plotting system.

Software Is Key

The key to the success of these desktop plotters is the HPPLOT program which can be used by time-share users to get graphic representations from selected portions of their data bases, according to Bill Murphy, HP marketing manager. As long as the user has sequential files, the program can help to plot certain outputs, Murphy said.

The program determines the proper labeling and scaling, and can be used by both technical and clerical persons, Murphy said.

The HP plotting method uses a 4-digit identification number that locates a point on the graphic matrix.

Most of the available desktop plotters will be used either in a commercial or in-house time-sharing system, according to industry observers. The typical executive will have at his desk a plotter which will receive inputs from a CPU shared by other plotter users throughout the company.

"It is a lot easier to analyze and comprehend data when it is in graphic form, according to Andrew Grace, vice-president of Time-Share Peripherals Corp., Danbury, Conn. The company makes small plotters that can interface with CPUs from a DEC mini up to an IBM 370 mainframe, and can be used in either in-house or time-sharing applications, he said.

Business Users Growing

About 20% of the firm's plotter users are business oriented and the number is growing, Grace said. Financial analysis and stock-market trends are two applications tailor-made for the desktop plotters, Grace said.

"Actually, any user that wants to see the curves associated with some sort of data can benefit from this type of device," Grace said.

While most of the desktop plotter vendors say they have not actively pushed their devices for the business user, the concept seems to be growing. Banks, insurance firms and other statistically oriented firms see the small plotter as a definite aid to management planning and understanding.

"When the user gets a visual display of his data, it means a lot more than just a list of numbers," according to Conrad Vance, sales manager at Zeta Research, Lafayette, Calif. The majority of users with desktop plotters will be working with business applications within three to five years, Vance said.

One factor that may be holding back the use of desktop plotters is the rela-

(Continued on S/Page 6)

Spooling Packages Solve I/O Problems

(Continued from S/Page 4)

Even though the output production is usually overlapped with the execution of the next application program in the job stream (which is then, incidentally, creating its own spooled output file), this approach probably results in some delay in printing or punching, compared to a full on-line operation.

Additional Files Created

While printing and/or punching may take as long or longer with a spooler, files other than the spooled I/O are produced, and therefore are available for subsequent runs faster than if they had been produced during on-line printing or punching.

Some of the spoolers require a dedicated DOS partition, use of a significant amount of core and use of IBM's Multiprogramming Support, since they are considered a separate DOS program. IBM's type III package, Power (now Power II), requires a minimum of 18K bytes of core, and with it, the user has only two partitions left for his application programs.

Several spoolers, on the other hand, reside outside of the normal partitions and do not require Multiprogramming Support. Examples of this type of package are Asap from Universal Software, Sprint from Jason and Grasp from Software Design Inc. Both Sprint and Grasp apparently can support concurrent spooling from three active DOS partitions.

No Longer Simple Spoolers

Grasp has long since outgrown a simple spooler image; it has enough other system features, usually at additional cost, to be an implementation of OS under DOS, in the view of some users.

Several other spoolers also provide features beyond their original I/O support. Sprint, for example, includes the capture and reporting of Job Accounting Statistics from DOS release 25 and 26, as does Grasp.

A package that builds on the spooling logic of Power, Powerpak, now the property of Johnson Systems, spools tape as well as card and printer I/O to disk for faster queuing and processing.

Whole program job streams are likewise controlled by this spooler, which requires 9K bytes of memory beyond the 18K bytes required by Power.

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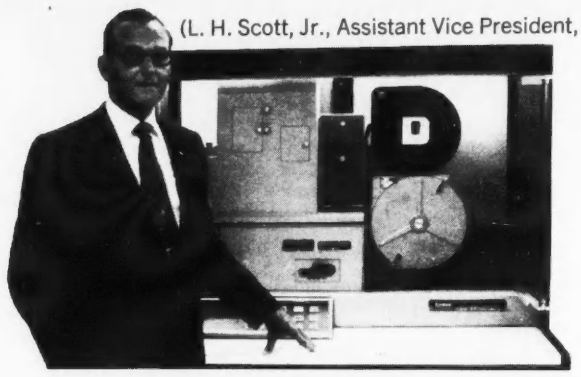

(L. H. Scott, Jr., Assistant Vice President, Seaboard Coast Line Railroad Co.)

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'Less Than 2 Service Calls a Year' — But Paper Does Cost More

High Reliability Marks Thermal-Printing Terminals

As more users need on-line output at locations that cannot tolerate an electromechanical teleprinter, the advantages of thermal printing terminals become clearer.

The number of installed terminals with thermal printers is still small but is growing. Texas Instruments (TI) has been delivering its "Silent" line for about two years and several thousand are already installed.

In addition to its quietness the thermal printing terminals are more reliable. Having few moving parts, the printer is less prone to failure.

"A thermal printer averages less than two service calls per year," according to Bill Gott, marketing manager for data terminals at Texas Instruments. In addition, the company performs no regular planned maintenance on the printers, Gott said.

The increased reliability is based on the printing method. When a character is printed, elements in a 5 X 7 dot matrix are heated. To print the letter "M," 19 dots or elements are heated. As each hot element touches the paper, the surface changes from white to a color usually black or blue.

"The paper is called thermochromatic and at temperatures over 300° F the dye on the paper changes color," according to Joel Novak, chief engineer at Computer Devices Inc., a division of Techven Association Inc.

A CDI terminal includes a 60 char./sec thermal printer, according to Novak, and the unit sells for about $3,200 with a modem.

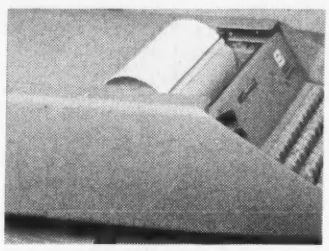
The mean time between failures for a thermal printer is about 14 months, Novak said, and he estimated the user can get about 50 million print cycles out of one thermal printing element.

Texas Instruments' Silent 700

The head is basically a "semiconductor matrix," Novak said, and the fact that it is almost totally electronic with minimal moving parts makes it reliable, he said

One of the drawbacks to the use of thermal printers is the relatively few forms available for users of thermal paper. The thermal paper costs about $1.50 per 100-ft roll and this is considerably higher than comparable TTY paper, Novak said.

Gott agreed that paper for the new printers does cost more but said the price will drop as more printers are installed and user requirements increase.



CDI 1030 Teleterm

Texas Instruments has a thermal printer terminal that Gott said is equivalent to the Model 35 TTY. It costs about $3,000 and operates at 30 char./sec. The speed of thermal devices is still relatively slow but is still faster than the 10 char./sec teletypewriters, he said.

A thermal printer that could print at much higher rates is definitely on the horizon, Gott predicted. He said TI is currently supplying a military thermal printer with a speed of 300 line/min. It would still be too expensive to build for commercial users, because multiple printing elements would be required to print at the increased speeds, he said.

A printer that could handle 132 print positions to keep up with a CPU output would require 132 print elements, Gott said.

But the cost of the printing elements will drop and a thermal printer for use as a console output printer will be feasible in the future, he feels.

In addition to being more reliable and quiet, the thermal printers also have another advantage. Because of their simpler construction, they take up less space than comparable impact devices. This suits them to use in portable terminals such as those available from TI and Computer Devices.

Ease of Retrieval Major Factor in Storage

By Edward J. Bride
Of the CW Staff

And what about storing all that paper? Or tapes? Or microfilm?

When DP managers buy filing cabinets and other devices for storing output, they sometimes consider such environmental items as color, safety and relative strength of the items.

Size, too, is a major factor, but the biggest item is apparently the ease of retrieving the filed information, or "filing – defined," as one of the world's largest users noted.

The problem is that there is little available information on how one method of storage might best suit one type of user, said Artell Ricks, director of the Paperwork Standards and Automation Division of the National Archives.

The Archives, a branch of the General Services Administration, may well be the biggest paper storage facility in the world, with 10 million cubic feet. Much of that space is not strictly dedicated to paper, however, with computer tapes and output microfilm growing in proportion, Ricks said.

The various branches of the National Archives are constantly researching better ways of using available technology, but nobody has undertaken a study or a review of the best methods of storing and retrieving computer output, he added.

"We are very definitely interested in storage," he commented. There is no question that a review is needed, but there is the usual problem of time and money confronting anyone who wants to pursue this interest, Ricks noted.

The problem is not unique to government, but spreads into business as well, he indicated.

Find the Data

The ultimate objective of an orderly filing system is to be able to find the data. How a system works for a particular type of user is normally discovered by trial and error, rather than scientifically, he noted.

Besides these study projects, workshops on forms for automation are presented about twice a year for government users, though these workshops stress forms design, rather than after-processing storage.

Ricks does expect the Archives to eventually get into the storage area of computer usage.

In the meantime, many computer users consider filing a necessary evil, and cannot give sufficient consideration to which cabinets, forms, binders, etc., would best suit their needs.

Different Problem

The problem is not strictly one of space, but also of knowing the value of the output, and this is a different kind of problem for managers.

> *"The problem is not strictly one of space, but also of knowing the value of the output, and this is a different kind of problem for managers."*

While there are no specific manuals available to users for the scientific planning of hard-copy retrieval, the Archives currently has projects under way to evaluate information retrieval systems in general, including computer output, he noted.

COM Handbook

The Archives has also contracted with a local company to develop a handbook for COM, and an inside project will soon lead to a guide for the maintenance and preservation and storage of magnetic records.

(New items being filed in the National Archives are being transferred to mag tape, although there is currently no plan to reduce old documents to this form of storage, Ricks indicated. This GSA branch is already heavily involved in microfilm).

In that area, too, the Archives is preparing a study for guiding computer users. The end product will be standards for tape-record disposal, as determined by content.

The alternative to disposing of these tapes will be sending them to any of 15 records centers for permanent retention. Ricks estimated that as many as 750,000 reels of computer tape might be stored in these centers within the very near future.

Some centers are already involved in this type of filing, he said. The data in this case is not strictly historical in the sense of political documents, but rather consists of transactions and other business-type data, he noted.

As a branch of the GSA, the Archives is where government financial records are stored until they can be purged; the individual records centers are the storage places for data that cannot be purged.

Most of the studies and brochures of the Archives will be made available to business, as well as government computer users, through the Government Printing Office or the Archives itself.

Registrations Critical on Data Input to Scanner

(Continued from S/Page 4)

can help the later scan run. But if one assumes the code is legible, the error rate is usually quite low, according to the phone company.

When the scan matrix is generated, the code is usually generated on the same lines as other hard-copy information on the bill. By aligning the coded data with the printed information, the printer does not have to skip lines, thereby speeding the print time.

The code used by Winter Park is a five-level code with even parity that can be formatted at the rate of 10 digit/in. horizontally and 6 digit/in. vertically. The phone company uses a matrix that has 17 digits horizontally by five digits vertically, but this could be modified to fit the needs of the user, according to a Cummins spokesman.

"This storage area isn't big enough for the both of us and these storage units."

Use of Desktop Plotters Growing

(Continued from S/Page 5)

tively unsophisticated state of many MIS systems, Vance said. Many managers are still used to "making the weight" with a report by having long lists of numeric CPU printouts delivered to their desks.

But these concepts are changing. One favorable aspect of the plotters is their relatively low price. Most of the units cost about $3,000 and some start as low as $2,500. Up to now only a small number of suppliers offered the desktop units but this number will grow as the product gains user acceptance.

There are some minor drawbacks such as the limitation of one copy/plot. But most observers don't see this as a major handicap for the user. It is easy enough for users to make a photocopy and if that is not possible, the plotters print fast enough so that a second plot of the same graph is not prohibitive.

For users who are interested in the advantages of desktop plotters and how they relate to DP operations, Hewlett-Packard, San Diego, Calif., has a free booklet available, "The Story of Computer Graphics."

Who's Responsible?

This Special Report was prepared under the direction of CW Technical News Editor Ronald A. Frank. Frank has also been responsible for the communications section since 1969.

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Printer and Plotter Use

Graphic Applications Benefit From Non-Impact Units

By E. Drake Lundell Jr.
Of the CW Staff

Non-impact printers can offer significant advantages over impact printers in certain applications, particularly those requiring graphic output in addition to typed alphanumerics.

The speed and quietness of electrostatic and other non-impact devices are also cited by users as major advantages of the units over more conventional systems.

But most users cited the lack of multicopy capability as one of the major drawbacks to using the units as well as high paper costs.

In graphics applications, the devices can often be used as both a printer and a plotter, users said, thus cutting costs.

For example, McDonnell Douglas Corp.'s Flight Test department estimated recently it would save over $63,000 this year over the previous system with an electrostatic printer/plotter through reductions in computer time, labor, material and maintenance.

The major application at McDonnell involves the preparation of performance data graphs on different aircraft from previously run tests.

The firm said the old system could only produce 12, 11-in. by 17-in. graph/hr and had to use expensive paper costing 10 cent/sheet.

But with the new electrostatic unit (a 4800 from Gould) the graphs are produced at a rate of one every two seconds, compared to one every five minutes with the old system.

Both systems tie into a 370/145.

One major advantage of the unit, McDonnell DP men said, is that it produces both alphanumerics and graphics at the same time. This means test data including grids, data and titling can be printed in the same pass.

Because of the unit's high printing speed, McDonnell said, it also uses it for core dumps, which are needed frequently to maintain the firm's six segment data base.

McDonnell users said they expected the system to handle a workload of 15,000 graphics page/mo as well as up to 100,000 pages of alphanumeric tabular listings.

But while the system is used primarily for graphics applications, McDonnell personnel said the unit is also used to print out work load and manpower schedules when not busy with the graphics requirements.

The capability of an electrostatic printer to handle both alphanumerics and graphics, both separately or intermixed, was the main reason it was purchased by Battelle-Northwest, according to Paul Dionne, technical leader for process analysis and simulation.

Battelle interfaces its electrostatic printing unit to both hybrid and digital systems on a multiplex basis, he noted, and uses it in a wide variety of simulation programs.

One interesting application, he indicated, employs the printer/plotter for complex graphics. The program involves the study of tracer dye movement and thermal patterns in bodies of water and is being used to evaluate condenser outflows from power plants and to predict the possible impact of proposed future sites.

> *"With manufacturers quoting speeds of over 3,000 line/min for some of the non-impact units, it is hard to justify staying with the impact units with a top speed of around 1,200 line/min, except for the multiple-copy capability." – a user*

Data is collected by aerial-imagery techniques and reduced in the hybrid analog/digital system. Stereoscopic pairs of thermal contour plots can be produced by the system, which permits three-dimensional viewing of the area under consideration.

According to a user at *TV Guide*, there were three major reasons for turning to an electrostatic printer.

"First," he said, we were looking for speed and the unit offers us greater speed than an impact printer.

"Secondly, we wanted a unit that was relatively quiet, since we planned to place it out near our editors. Impact printers can be awful noisy when operating at full speed, and that would have interrupted the work around them or else we would have had to place the printers away from the main working area.

"And finally," he added, "we wanted a unit capable of producing multiple-type fonts and intermixing those fonts. The electrostatic unit we are using can produce different type fonts very easily under computer program control.

"Of course," he added, "the price was also very attractive."

Paper Problems

But at the same time, the *TV Guide* user said there were a few minor problems with the units, mainly involving the paper.

"It would be nice," he said, "if the paper were the fan-folded type instead of the roll type. The present paper tends to curl at the end of a roll and we seem to spend more time worrying about the paper than anything else."

Speed Impressive

The speed of the units, in addition to the graphics capability, is impressive to some users.

"With manufacturers quoting speeds of over 3,000 line/min for some of the non-impact units," one said, "it is hard to justify staying with the impact units with a top speed of around 1,200 line/min, except for the multiple-copy capability."

However, many manufacturers of the non-impact devices point out that with their systems a user could print several copies of one document in a row in about the same time it takes to make one print run on a more expensive line printer.

In many applications, one marketing man said, users tend to print extra copies of documents unnecessarily just because their systems are set up for multiple copies in other applications.

Determine Need

"By turning to a system without this multiple-copy capability," he added, "a user should evaluate his applications and determine which applications don't need extra copies and which do need them then print those extra copies that are really needed serially or copy the original. They might find that they will eliminate a lot of paper pollution."

Another objection to the units involves the cost for paper, which is generally running around one cent to two cents a sheet for an 8-1/2-in. by 11-in. sheet, significantly higher than the paper costs for impact printers.

However, most users and manufacturers report the higher paper cost is more than offset by the lower initial cost of the units.

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COMMUNICATIONS

Data Briefs

CRT Replaces Model 33 TTY, Operates to 9,600 Bit/Sec

WILLOW GROVE, Pa. – Digi-Log Systems Inc. has a CRT terminal to replace the Model 33 TTY. The device includes an acoustic coupler but can also be hardwired to a data link for transmissions with Ascii terminals operating at 110, 300 or 9,600 bit/sec. The higher speed is possible only if the unit is hardwired to the phone line, the company said.

The CRT can display 1,280 characters and the keyboard duplicates a teletypewriter layout. The terminal can be used both on-line and off-line. Called the Model 33, the device costs $1,395 and is available in 40 days from the company at 666 Davisville Road., 19090.

Terminal Handles Most CPUs

MOUNTAIN VIEW, Calif. – Di/Phase Inc. has introduced an inquiry/response terminal that contains a built-in Bell 103-type modem and operates with most CPUs.

Including both a CRT display and a 128-character Ascii keyboard, the terminal can transmit data in asynchronous mode up to 300 bit/sec over dial-up lines. Called Scepter II, the terminal costs $995 and is schedule for first deliveries in January 1973.

The firm is at 914 Rengstorff Ave., 94040.

Westinghouse Has Batch System

PITTSBURGH – Westinghouse has a general-purpose remote-batch computer terminal for the low-volume user.

The Model 1550/2780 terminal supports binary, synchronous communications at 2,000 bit/sec (dial-up) or 2,400 bit/sec (private line). The system includes a minicomputer with 4K words of memory, an operator's console and worktable, data set interface, 300 card/min reader and 250 line/min printer. The device leases for $650/mo, compared to $900 for comparable units, the company said.

The terminal system is aimed at the low-speed user who typically operates a terminal less than four hours a day. It is said to be the first in a family of remote-batch terminals which utilize the Westinghouse 2550 satellite processor.

The 1550/2780 is offered in a fixed configuration as a substitute for the IBM 2780 Model and is compatible with that system's software supporting remote job entry. The system includes: EBCDIC transmission code; autoanswering for dial-up lines; automatic turnaround and an off-line card-to-print operation.

Included in the leasing price are maintenance, personal property taxes and insurance. Purchase price of the system is $23,500. Westinghouse Electric Corp. is at Gateway Center 15222.

Users Expected Soon

Interactive Cable Net Being Tested

By a CW Staff Writer

EL SEGUNDO, Calif. – An apartment in this city contains an interactive terminal that can communicate with a computer about four miles away. While this may seem routine, the communications between the terminal and the minicomputer are being carried via a two-way cable TV (CATV) system that is probably the prototype of large-scale interactive CATV systems.

The test apartment duplicates a typical subscriber environment in every way except one – there is no tenant. The apartment is part of the Theta-Cable system which provides regular CATV programming to El Segundo subscribers.

Final Step

The transmissions between the test apartment and the DEC PDP-11 that will control the Subscriber Response System (SRS) are described as the final prototype step before regular subscriber services can begin. SRS was developed by Theta-Com, a research affiliate of Theta-Cable.

Before the apartment terminal was connected to the system, Theta-Com had operated about 30 prototype terminals at the computer center or "head end," as it is known to CATVers. Operating in a "local mode" the prototype terminals were used to develop and test the SRS applications software.

Programs have been written for a wide variety of existing and new services which ultimately will be offered to subscribers in the home. Existing services are classified by the firm as those presently available in the home using conventional communications such as the telephone.

Presently available services include meter reading, home shopping and reservation services. New categories include opinion polling, interactive education in the home, audience participation programs and off-track betting, according to the firm..

The terminals developed for the SRS system are called Subscriber Consoles, and include a larger unit with full numeric keyboard and an abbreviated device with a slide switch and three control keys. Each model contains a paper tape cartridge-type strip printer which provides the potential subscriber with a written record of his completed transaction.

Among the optional features with the terminals are a 100 word/min non-impact "paragraph printer," an emergency alarm interface, a meter-reading interface and an external timer.

Two-way interactive communications between the PDP-11 at the Local Processing Center (LPC) and the Subscriber Terminal require the installation of a modem behind the subscriber's TV set. The Subscriber Console is connected to the modem by a cable.

The LPC contains a standard PDP-11 mini with 24K memory and a Model 35 TTY. A specially built I/O processor converts the parallel output of the mini into serial form for transmission of signals over the cable system. Peripheral equipment includes a time-of-day clock, 256K disk, mag tape drive, card reader and a CRT with hard copy. Manual inputs for special programs can be entered via the TTY.

The SRS system transmits digital data at a 1 Mbit/sec rate and proprietary design features are said to reduce the effects of propagation delays. According to preliminary tests, 50,000 subscribers can be "interrogated" for short answers in about 2.4 seconds.

In a laboratory test, a program was run to simulate the simultaneous ' 'purchase' of a premium TV channel by 1,000 subscribers. The average response time in the SRS system to provide this service was about 1.7 seconds, Theta-Com said.

Sports Event Tickets

In a typical application, a subscriber will be able to order tickets to a sports event by entering the pertinent information on his terminal. Included in the data that the subscriber transmitted to the LPC would be the numeric code for the team, the exact stadium location requested, ticket price, date, etc.

A confirmation of the ticket reservation would then be transmitted back to the subscriber via the strip printer.

If the apartment tests prove successful as expected, the 30 prototype terminals will be installed at selected subscriber sites. Present plans call for a 1,000-terminal system offering commercial subscriber services by the spring of 1973.

Honeywell Model 58 Provides 'Bridge' for HIS, IBM Mainframes

By Ronald A. Frank
Of the CW Staff

WELLESLEY HILLS, Mass. – The recent enhancements introduced by Honeywell Inc. for its small Model 58 CPU [CW, Sept. 27] provide some important multivendor capabilities for the business/communications user. And the 58 is more flexible than the IBM System/3.

By adding binary synchronous transmission capabilities to the Model 58, the vendor has provided a "bridge" system for users with both Honeywell and IBM mainframes. One of the major problems for the business user with non-compatible CPUs has been the configuration of a communications network that would allow his systems to communicate with each other.

The more sophisticated users have managed to tie their systems together through extensive use of communications software with customized message switchers and front ends.

But the problem has been difficult for the business-oriented user. Although he may need satellite processors in his network, he is not in a position to undertake an extensive system reconfiguration.

This is where the upgraded Model 58 fits in. It is basically a satellite processor with relatively simple communications. The single-line communications controller allows the 58 to communicate with the HIS 200, 2000 and 6000 mainframes; with IBM 360/370 systems; and with other 58s. The S/3 is limited to communications with IBM mainframes.

The controller, the SLC 058, is a synchronous buffered transmission device that handles data traffic at 2,000 bit/sec on dial-up lines with speeds of 2,400 and 4,800 bit/sec on private lines.

Analysis

The additon of the controller to a Model 58 costs the user $208/mo on a five-year lease. In contrast, the IBM binary synchronous communications adapter that can be added to the S/3/10 costs between $300/mo and $385/mo depending on the specific configuration.

In addition to the controller, the Model 58 printer now has a top speed of 650 line/min compared with the S/3 printer's speed of 200 line/min. Other peripheral capabilities have also been improved to make the Model 58 an attractive system for the business user who wants to expand his communications.

OTP Teleprocessing Subject of GE Study

BETHESDA, Md. – General Electric's Information Services Business Division (ISBD) will study teleprocessing systems for the Office of Telecommunications Policy (OTP). OTP is an arm of the Executive Office of the President.

ISBD will develop a model to determine the relative cost/performance of various system configurations for data-based teleprocessing systems. The model will be developed using Fortran IV and ISBD's Mark II time-sharing service in both the interactive and remote batch modes.

OTP staff members will use the model to examine the effects of communications policies. In addition, the six-month study will examine the economies of scale for hybrid computer-communications systems.

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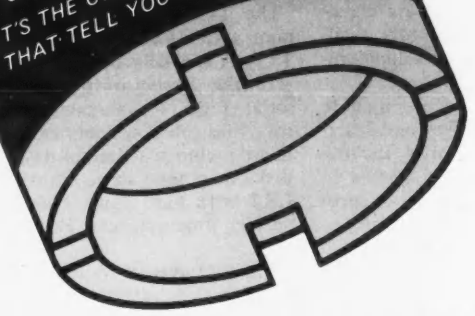

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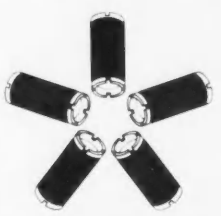

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Users Mull Show Benefits

By Ronald A. Frank
Of the CW Staff

Since this is the season for communications-oriented conferences, *Computerworld* asked users attending two recent meetings to describe the benefits they are getting from these sessions.

The discussions were held at the Telecommunications Association Conference (TAC) in San Diego and the Communications Systems Management Association (CSMA) meeting in Chicago.

Michael Morales, assistant vice-president, Mitchum, Jones & Templeton. "We run 26 lines and 54 terminals. These conferences give me a chance to find out how other communications users are saving money. We are all told to improve service and cut costs so you have to know what others are doing."

Bob Riebe, communications analyst, The Pillsbury Co. "As a user I come here to see what the vendors are offering. It is a lot more convenient to talk to them at a show rather than have them visit you individually at work."

Don Shearer, corporate telecommunications manager, Aerojet General Corp. and president of TCA. "These conferences are designed to bring the user and the vendor together to discuss current applications. About 65% of our members have some data communications and the number is growing. So it is important that we keep up with the latest developments."

John Schneider, assistant manager of DP systems, Kellog Co. "We plan to expand our communications system into Canada and Mexico. This show was a good place to talk to users who had solved this kind of problem and also make contact with vendors who can supply the equipment."

Olsen and Tate

Ralph Olsen, telecommunications systems analyst for Allied Mills. "I come to these communications conferences to keep up with the latest developments. Usually they are worthwhile."

William A. Tate, manager of systems development at Allied Mills. "We are already doing some of the things that are being described here as new. When a carrier tells me about his services that he will have five years from now, it doesn't do me much good. I can't plan more than two years ahead.

"We want to hear about other users' problems and how they solved them – that is more meaningful than just listening to vendors."

CW Inquiring Photographer

Shearer

Morales

Schneider

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Still Being Planned

FJCC Seminar to Serve Analysts

By a CW Staff Writer

MONTVALE, N.J. – Inventory management, materials requirement planning and scheduling systems will provide the focus for the manufacturing-applications seminar, one of the "adjunct" programs set for the Fall Joint Computer Conference.

The Disneyland Hotel Convention Center will be the site of the four applications-oriented seminars, while the nearby Anaheim (Calif.) Convention Center will provide the exhibit space and rooms for the technical program.

The Dec. 5-7 meeting is sponsored by the American Federation of Information Processing Societies (Afips), which is headquartered here. As late as mid-October, the seminars had not yet been finalized, Afips acknowledged.

The manufacturing seminar will take place Wednesday, Dec. 6, and will run concurrently with the banking seminar, which was previously announced for Dec. 5.

The other two seminars, medicine and information data centers, will take place Dec. 5, as announced.

The manufacturing seminar will be chaired by Richard T. Lilly, president of Manufacturing Management Sciences, Inc., Burlington, Mass.

Basic Modules

The purpose of the seminar, as stated by Lilly, is to define the requirements for implementing the "basic modules for a manufacturing system," including inventory management, materials requirement lanning and scheduling systems.

The seminar is directed to system analysts and manufacturing personnel involved in implementing these systems, Lilly noted, adding the "main theme is to explain the pitfalls involved in the design and implementation of these systems."

Papers presented in the four seminars will not be published, Afips said. Each seminar is divided into four separate sessions, with the respective chairmen participating or simply coordinating, as they prefer, a spokesman said.

Regarding the manufacturing seminar, Lilly said the topics would be divided into eight major categories: overview of manufacturing management systems, the master schedule, data base requirements, forecasting modules, management controls, requirements planning, requirement control and on-line scheduling.

Other FJCC information is available from 210 Summit Ave., 07645.

Second Acpa Confab To Feature Fellows

KENSINGTON, Md. – Navy Cmdr. Grace M. Hopper will become one of the fellows next month.

She will receive the Fellow Award of the Association of Computer Programmers and Analysts (Acpa) when the association holds its second annual conference Nov. 10-12. Dr. Carl Hammer, one of the first Acpa fellows and head of Univac's computer science department, will keynote the meeting in Saddle Brook, N.J.

One of the highlights of the conference, Acpa said, will be a panel discussion on "Unionism or Licensing – Take Your Pick."

Information is available from P.O. Box 95, 20795.

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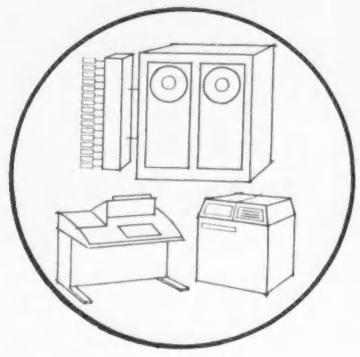

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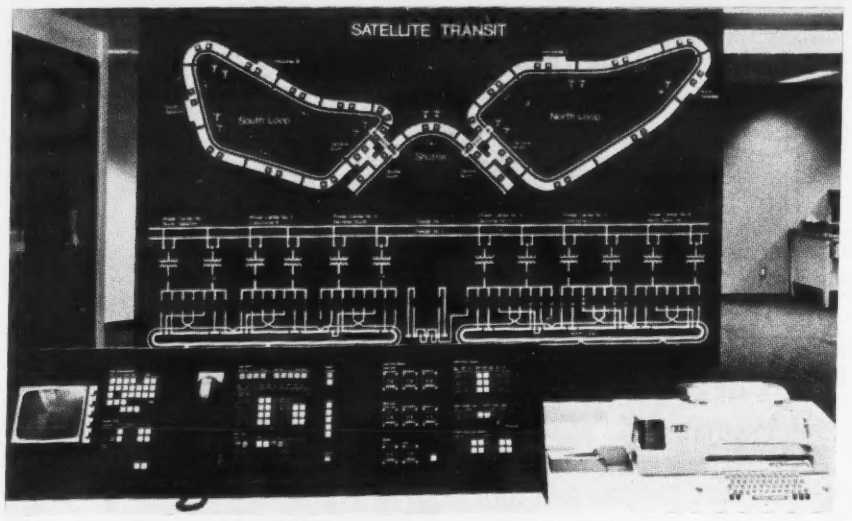

The operator's console for Seattle-Tacoma International Airport's automated subway system is controlled by a Westinghouse P2000 computer.

Automated Airport Subway– A Real-Time Fail-Safe System

By Robert L. Glass
Special to Computerworld

SEATTLE – Deep under the Seattle-Tacoma International Airport, people-moving cars, their controls untouched by human hands, are roaming through the tunnels of a subway system.

The automated subway is a sort of grand climax to the enormous modernization of Sea-Tac Airport.

In contrast to the subterranean system, the central control room for the subway, housing the Westinghouse P2000 computer which helps operate it, sits on the fourth floor of the parking garage.

P2000 One Element

The P2000 is only one element in a complex, fail-safe, real-time system which controls and schedules the trains below. Eighteen closed circuit TV cameras in the central control room monitor the subway system. An on-board, hardwired computer on each train controls another facet of the system. Basic vehicle control is a hardwired, electronic non-computer, down in the vehicle maintenance area.

And as a final part of the system, there is a man in the loop – on about a "one third of man per shift" basis, according to Westinghouse, prime contractor for the system.

Riding one of the trains through the darkened subway is an interesting experience. There is no one aboard who is in charge. A lighted information panel keeps passengers posted on where they are. And you're not really certain, after years of programming experience, that you want to trust your life to someone else's programming capabilities!

Computer Not Fail-Safe

The computer, according to those who built the system, is not a fail-safe element. Yet the total system must be fail-safe. Therefore, the computer is employed as a passenger comfort and convenience device, and for optimizing the basic hardwired system, but the subway could run (less efficiently and effectively) without it.

Still, the P2000 does some pretty important things. It controls the removal of trains from the track for maintenance purposes, and their reentry later. It keeps track of the location of the nine trains. It calculates times and speeds of the trains, and drives the operator's control console in the central control room.

It allows operators to revise waiting times for trains in a station, and make other data entries. And, if part of the subway tunnel becomes blocked, it controls a "shuttle mode" of operation in which trains move back and forth instead of around a loop.

The non-programmable on-board computer controls only the acceleration and deceleration of the train; its read-only memory can be tweaked by engineers to fine-tune these functions, but once it is set, the train accelerates and decelerates to preplanned patterns.

Modular Software

The programmable P2000 has a basic real-time executive, and a highly modular set of software designed specifically for the Sea-Tac subway application.

A modified Fortran IV compiler was used to code the seven modules – one for system startup, one controlling the programmer's checkout console (a teletypewriter), one which scans system inputs each second to establish system status, one which tracks all trains currently in the system, one for sending commands to trains, one for controlling the transfer table which moves trains to and from maintenance and one which services the operator's console.

Checking out the software was a lengthy process, and program designs changed frequently as the concept of the subway itself progressed. In the latter stages of checkout, a patchboard which simulated inputs from the subway system was plugged into the P2000 to help check out interfaces with the real world.

The real world, in this case, is three train tracks; trains running on these tracks at speeds up to 26 miles/hour; and nearly two miles of track divided into segments with built-in interlocks to prevent more than one car from being on a segment at a time.

And the real world is people, up to 105 per train, relying on a computer-augmented system to bring them safely to their destinations.

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New Literature

A brochure describing the System/6000 extended core memory system, for use with IBM 360s Model 50 and up, is available from Data Products Corp., 6219 DeSoto Ave., Woodland Hills, Calif. 91364.

The 7260 data transmission system from the Tele-Dynamics Division of Ambac Industries is described in a brochure from 525 Virginia Drive, Fort Washington, Pa. 19034.

Specifications and options of the International Teleprinter Corp. tape readers are discussed in a folder from 493 Washington Ave., Carlstadt, N.J. 07072.

The Asset real-time operating system for use with the 6145 Mission-Matched computer from EMR Computer is available by writing for EMR Publication No. PP 1100-004, EMR Computer, 8001 Bloomington Freeway, Minneapolis, Minn. 55420.

The Compat 88-23 Data Terminal is described in a brochure from Compat at 177 Cantiague Rock Road, Westbury, N.Y. 11590.

The Bell & Howell 240 digital cassette recorder is covered in a bulletin available from the company's Electronics & Instruments Group, 360 Sierra Madre Ave., Pasadena, Calif. 91109.

The capabilities of the Systems 85 and 86 real-time computers are discussed in a brochure on "The Systems Family of 32-bit Price/Performance Leaders" from Systems Engineering Laboratories, Inc., Communications Department, 6901 West Sunrise Blvd., Fort Lauderdale, Fla. 33313.

The Corpak line of add-on memory units for the PDP minicomputers is discussed in a 12-page brochure, "How to Enlarge Your Little Memory." For a copy write Gary McMullin, Vice-President, Information Control Corp., 9610 Bellanca Ave., Los Angeles, Calif. 90045.

The Series 160 printer interface, designed to interface the Printec-100 line printer with Data General and Digital Computer Controls minis, is described in a brochure from Mini-Systems, Inc., 4935 Boone Ave. N., Minneapolis, Minn. 55428.

Edits, Systems Engineering Laboratories' computer-based system for preparing schematics, logic diagrams and other technical diagrams is described in a brochure from the firm's Communications Department, 6901 West Sunrise Blvd., Fort Lauderdale, Fla. 33313.

A brochure describing the Termi series of digital cassette recorders and memories is available from Pat Riley, Telex Communications Division, 9600 Aldrich Ave. S., Minneapolis, Minn. 55420.

COMPUTER INDUSTRY

CI Notes

IBM Finds Judges Scarce

NEW YORK – IBM admitted in Federal District Court here last week that it is having a hard time finding a panel of judges to hear an appeal in the government antitrust suit against IBM.

The reason is simple – IBM stock is widely held in the legal community and at least two judges have had to excuse themselves from hearing the case because of their holdings.

Remote Access Growth Seen

CHICAGO – Of the $305 million presently being spent on time-sharing, database inquiry and transaction processing services are growing at an annual rate of 40%, according to Richard H. Orenstein, president of National CSS Inc.

The two services currently account for about $120 million in annual revenues and are the fastest growing areas in the DP services industry, he told a meeting of the Chicago Science Analysts.

Pertec Plans Shared Processor

LOS ANGELES – Pertec Corp. is planning to enter the shared processor marketplace with a product expected to go into production in mid-1973, according to Harold Kurth, president.

The unit would take advantage of the firm's experience in manufacturing tape transports, disk drives and key-to-tape data entry systems, he said, as well as its data communications modules.

Supershorts

The Data General vs. Digital Computer Controls suit in which Data General alleges that DCC has wrongfully appropriated proprietary information will go to trial since the Delaware Supreme Court recently ruled against DG's motion for a preliminary injunction and the DCC move for a summary judgment.

– – –

Time Brokers Inc., a used computer dealer, has purchased the complete inventory of XLO-Bryant disk storage files, which will allow it to offer a complete package of used systems plus compatible disk drives.

– – –

The first of 35 Honeywell computers purchased by the government as part of the World Wide Military Command and Control System (Wimmix) has been dedicated. It will be operated by the Joint Technical Support Activity, an element of the Defense Communications Agency.

– – –

Wabash Magnetics Inc. has entered the Eastern European market with the announcement of an approximately $500,000 order for a computer disk certification device from the Institute Mihailo Pupin, Belgrad, Yugoslavia.

IBM, Burroughs, CDC

Earnings Signal Demise of Recession

By a CW Staff Writer

If the financial condition of the mainframe makers is used as the yardstick, then the computer industry has clearly weathered the recession and is well on the way to a 15% to 20% growth year.

Third-quarter and nine-month financial reports from IBM and Burroughs indicate records both in terms of revenues and earnings, while the Control Data statement for the same period indicates a sharp turnaround from the loss position a year ago.

In the third quarter, IBM registered the highest earnings of any quarter, $320.9 million, and record third-quarter revenues of $2.33 billion.

Earnings for the period rose 20.2% on a revenue growth of 12.1% compared with figures for the 1971 period. The $320.9 million earnings, or $2.76 a share, were up from $266.9 million, or $2.31 a share in the same 1971 period.

Third-quarter revenues a year ago were $2.08 billion.

"A better measure of the progress of the business," nine-month rental and service revenue, increased 9.1% from the year before, according to Chairman T. Vincent Learson.

This figure shows a rise from the 1972 six-month increase of 8.8%, but is less than the 1971 nine-month growth of 12.5%.

"Installations of new DP equipment continued at a relatively high level during the third quarter of 1972. The level of outright purchases of DP equipment was higher in the third quarter and nine months than in the comparable periods of 1971 and contributed significantly to the year-to-date increase of 19% in total gross income," Learson said.

In the record-setting nine months, IBM's earnings rose 21.5% to $938.8 million, or $8.10 a share, from $772.8 million, or $6.72 a share. Revenue totaled $7.01 billion, up 19% from $5.89 billion in 1971.

Burroughs Records

Burroughs scored records for earnings and revenues in both the third quarter and nine months, with quarterly earnings rising 29% on a 16% revenue growth over the same 1971 period. In the nine months, orders for DP products rose 39%.

Earnings for the third quarter totaled $16.4 million, or 88 cents a share, compared with $12.7 million, or 69 cents a share. Revenue climbed to $250.1 million from $214.8 million in the year-ago quarter.

In the nine months, earnings rose 20% to $48.9 million, or $2.63 a share, from $40.5 million, or $2.21 a share last year. Revenues rose 11%, to $722.7 million from $648.7 million.

Worldwide backlogs have risen 30% since the beginning of the year, noted President Ray W. Macdonald.

Recent settlement of a suit filed by Trans World Airlines will result in a charge against 1972 earnings of about $4.8 million, or 26 cents a share.

Macdonald said he expects this year's earnings to "show good growth" over 1971 even after absorbing the charge.

CDC's Story

Figures at Control Data Corp. for the third quarter reveal a very different story from that of a year ago, when the firm suffered a $9.8 million loss from computer operations, causing reduced earnings for the period.

Excluding income from subsidiary Commerical Credit, which boosts the bottom line considerably, and other approximately 50%-owned affiliates, third-quarter earnings rose to $3.6 million from a loss of $10.8 million in the year-ago period. Revenues reached $168 million compared with $123 million last year.

The quarter's improved performance also showed in the nine months, when earnings climbed to $6.1 million compared with an $8.5 million loss in the 1971 period. Revenues totaled $461 million, up from $405 million in the nine months last year.

Adding in Commercial Credit's activities, the quarter earnings total $16.7 million, or $1.09 a share compared with $337,000 in the 1971 third quarter.

Revenues rose to $96.8 million from $67.1 million a year ago.

In the nine months, earnings totaled $45.7 million, or $3.03 a share on revenues of $260.6 million compared with earnings of $26.3 million, or $1.74 a share on revenues of $242.9 million.

Add-On Memory Price Erosion Seen Hurting User, Supplier

LOS ANGELES – So far the independents in the add-on memory market have only "scratched the surface," according to Gary Goldstick, president of Information Control Corp. (ICC) here.

At the same time, Goldstick said competition and price erosion caused by competitors in the market had hindered its growth more than any other factor, including the competition from IBM and its earlier threat to withdraw maintenance from certain oversized computer systems.

The tremendous competition among the independents and the resulting price erosion, Goldstick stated, have caused a shakeout in the business which will probably get worse in the future.

The price-cutting hurts both the suppliers and the users, he added, because with extremely low prices a firm could not afford to give the user the needed service and support.

The service and support are cut first when a company is forced to lower its prices, he said, and the user is the loser in the long run, even if he gets equipment at a lower rate.

The memory enhancements, he added, have opened the door to other system enhancements, allowing users to use their equipment longer and more effectively than in the past.

He said ICC was actively investigating other products that could be used to enhance the 360 series, especially 360s with expanded memories. Peripheral equipment that would offer superior price performance capabilities to the upgraded machines was high on the firm's list, he said.

Another area under consideration for products, according to Goldstick, was the System 3 area.

In a few years there will be over 40,000 S/3s in use, he predicted, noting the market could be lucrative for firms supplying add-on memory and other peripherals. Presently the largest S/3 available is a 48K unit.

Upgraded S/3s would also be a market for other peripheral equipment, he noted.

Government Settles Memory Patent Suit With Technitrol

PHILADELPHIA – An eight-year patent suit over rights to a 1952 patent for a magnetic data storage system has been settled, with the Justice Department agreeing to pay Technitrol Inc. a $200,000 settlement.

Under terms of the stipulated agreement proposed to the Federal Court of Claims in Washington, Technitrol would agree not to appeal the case.

The patent was granted to Thomas K. Sharpless and his partner, E. Stuart Eichert, who is president of Technitrol.

Patent Granted to Two

The claims court had earlier ruled in favor of the Justice Department, agreeing that the government was licensed under the patent because the late Sharpless was working under government contract when the invention appeared.

A trial commissioner had recommended settlement in behalf of Eichert, arguing that the government wasn't licensed because a key element of the system was invented by Eichert.

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Isoelastic Drive

Kennedy Unveils Cartridge Recorder

ALTADENA, Calif. – The Model 330 Digital Cartridge Recorder from Kennedy Co. combines 3M's 1/4-in. tape cartridge with its isoelastic drive system.

The tape drive is bidirectional at 25 in./sec normal speed with a transfer rate of 40 Kbit/sec at 1,600 char./in. recording density.

Forward and reverse search modes, as well as rewind speed, are 90 in./sec.

Model 330 is equipped with a dual gap read/write head for read-after-write operation. One, two and four-track versions are available. Each track is treated independently, allowing cartridge interchange between transports of differing track configurations.

Prices range from $200 for mechanics only to $750 for four-track write electronics in quantity from the firm at 540 W. Woodbury Road, 91001.

Other OEM Products

Facit-Odhner, Inc. has introduced a lightweight punch head mechanism for paper tape, the Model 42-8033-03.

The unit is 6 in. wide, weighs less than 9 lb, and punches 5- or 8-track paper tape.

– – –

Signal Galaxies, Inc., Van Nuys, Calif., offers a solid state, plug-compatible add-on memory for Digital Equipment Corp.'s PDP-12.

4K of expansion memory costs $2,850 while 8K is priced at $4,050. Memory is expandable in 4K increments to a total of 28K.

– – –

The MCB4-10 interconnection chassis from Intel Corp., Santa Clara, Calif., facilitates the assembly of Intel MCS-4 micro computer systems without hand wiring.

The MCB4-10 chassis interconnects the SIM4-01 prototyping board and the MP7-02 PROM programming board to form a complete PROM programming and test system, and a functioning micro computer. The unit costs $375.

– – –

The Model RO-10C Series I Readout Electronic Systems from Computer Equipment Corp., Rockville, Md., convert mechanical motion to digital readout by coupling shaft optical encoders to user positioning devices.

– – –

A relay tree type BCD Decoder/Driver, employing a magnetic latching relay which plugs directly into a PC board without soldering or sockets, has been introduced by the Printact Relay Division of Executone, Inc., Long Island City, N.Y.

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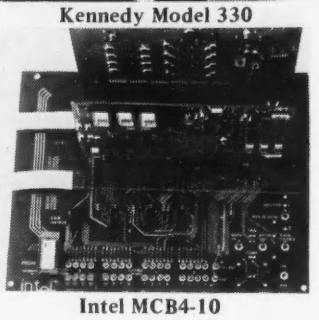
Single Phase Static Uninterruptible Power Systems up to 40 and 50 KVA, 2 wire output, have been announced by Cyberex, Inc., Willoughby, Ohio.

Kennedy Model 330



Intel MCB4-10

'Breakthrough' Seen in Hong Kong

Special to Computerworld

HONG KONG – Computing was a little late in coming to Hong Kong, but now, one local computing businessman says, there has been a "breakthrough."

The "pioneers" didn't get started here until 1963, when Hong Kong University and China Light and Power Co., Ltd., moved into the second generation, batch-oriented machines.

In the intervening nine years, the computer hardware headcount has grown by a factor of 35, and computing dollar value by a factor of 80.

By the end of 1972, 70 computers, worth more than $40 million, will have been installed.

Part of this growth spurt took place in 1966 when on-line computing came to several Hong Kong banks.

But the biggest move, with the most potential, began early this year when smaller companies ordered office-type computers, such as IBM's System/3.

M.E.J. Smith, marketing manager for IBM in Hong Kong, calls the move a "breakthrough," penetrating the prime barrier to wider use of computing in Hong Kong, "education of local management."

Thirteen System/3s are currently on order, according to Smith. The growth curve for "large" computer systems is leveling off, while that for small computers is accelerating rapidly. Marketing surveys show a "very large untapped market potential" in small systems for small businesses.

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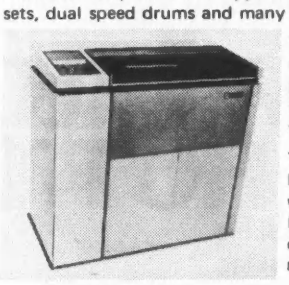

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First U.S.-Japan Conference Exceeds Expectations

Special to Computerworld

TOKYO – The first U.S.-Japan Computer Conference exceeded its goals in both overall attendance and exhibits, although the number of U.S. attendees and exhibitors fell below expectations.

Fewer than 250 U.S. attendees registered at the conference which was sponsored by the American Federation of Information Processing Societies (Afips) and the Information Processing Society of Japan.

Initial forecasts had indicated between 700 and 800 were expected; however Japanese attendees pushed the total registration to over 1,000.

The exhibit hall contained 38 exhibitors, with only Bendix Corp., California Computer Products, Digital Equipment, General Electric, Information Magnetics, and Peripheral Data Machines from the U.S. A number of other U.S. products were shown by their Japanese distributors.

In his opening address on the "State of the Japanese Computer Industry," S. Imamura of the Institute of Information Technology, Tokyo, said the number of computers in Japan reached 12,800 by the end of March 1972, a 35% increase. These computers had a value of $3.7 billion, an increase of 28% in twelve months. About 78,000 people are currently working in Japan on computer activities, he said.

Estimates indicate there will be 38,000 computers valued at $11.4 billion in Japan by March 1976, with 405,000 people working as systems analysts, programmers, and operators, Imamura noted.

The computer industry has been the most rapidly growing major industry in Japan over the last five years, maintaining an annual average of 53% in the 1966-1970 period, he said.

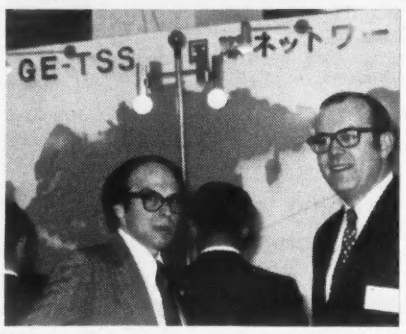
U.S. delegates were surprised at the high level of technical competence displayed in the Japanese products at the exposition as well as the level of computer architecture and application techniques indicated in the conference papers.

Particularly impressive was the sophistication shown in the terminal products produced by Japanese manufacturers.

The significance of the sophistication of terminals was highlighted by projections contained in a paper on "LSI and Systems Architecture in the '70s" by M.G. Smith of the IBM Watson Research Laboratory.

A reduction in cost of processor memory and logic to a large scale integration will be very dramatic within the next eight years, Smith said. Using the technology of 1980, the 100,000 computer processors and gigabillion bytes of memory in use in the U.S. by the end of 1972 could be produced in 1980 for a total cost of $7.5 million, he predicted.

This development would result in a redistribution of logic and memory throughout the system configuration, giving terminals the logic and memory capability equivalent to a medium-sized computer of today, Smith said.



Robert M. Cohen, staff consultant of GE's Timesharing Operations in Japan discusses his company's plans for expanded services in the Far East with P.J. McGovern, publisher of *Computerworld*.

A computer-based data communications system in the late '70s, with, for example, 5,000 terminals, would have 57% of its value in the terminals, only 11% in the processor and main memory, 11% in lines and modems, 11% in large digital files, and 9% in other areas, he estimated.

Among the Japanese manufacturers showing advanced terminals were Iwatsu Electric Co. with an intelligent terminal using a microprogrammed processor, Tamura Electrical Works, with an acoustic coupled active typewriter terminal, and Toshiba Ltd., with a variety of color graphic display terminals.

Prof. H. Zemanek of Austria, Ifip President, welcomed this binational meeting and said he expected there would be additional multinational meetings for technical information interchange held between the tri-annual Ifip conferences.

At the conference luncheon, the honorary conference chairman, Richard I. Tanaka from California Computer Products said he hoped this would be but the first of a series of U.S.-Japan Computer Conferences

21 Nations Exhibit At French Show, Sicob

By M.C. Dobelis
Special to Computerworld

PARIS – The recent 23d annual Salon International de l'Informatique de la Communication et de l'Organization du Bureau (Sicob) was truly international, with 578 companies from 21 countries exhibiting over 1,400 items.

The 10-day show drew 294,000 visitors, a slight drop from the record 1971 attendance of 323,000.

The first two days were reserved for professional visitors and a DP seminar with 37 sessions under the general heading "Employers and Professionals, a Constructive Dialogue."

On later days there were DP and business equipment user meetings, with sessions devoted to teachers, secretaries, public notaries, librarians, physicians and buyers, as well as equipment dealers and repairers.

Sicob is sponsored by Ficob, the association of French business equipment and furniture manufacturer and importer groups.

In the opening address, French Prime Minister Pierre Messmer called for improved productivity in the use of DP, to assure better rapport between the administrator and the public, and to free the administrator from the menial tasks which often dehumanize his contact with the public.

Messmer welcomed the appointment of Compagnie Internationale pour l'Informatique (CII) to represent the German Siemens operations in France. He said he expected the Siemens-CII agreement for the first binational construction to lead to further European multinational agreements to assure Europe's participation in the world market.

M.C. Dobelis, director of systems of the Guardian Life Insurance Company of America in New York, was a visitor at the 1972 Sicob.

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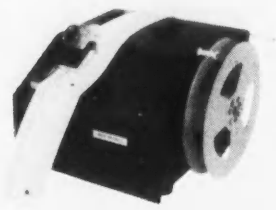

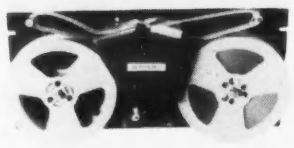

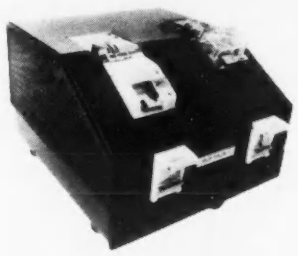

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Computer Systems Spark Growth in Typesetting

NEW YORK – Success in the computerized typesetting field, which is expected to grow at least 30% yearly from 1971-1975, will depend on how well a firm can develop software and other non-equipment support, as well as how well it can develop hardware, according to Frost and Sullivan, a market research firm here.

"The value of electronic typesetting equipment in 1971 is expected to be $74 million, rising to $250 million in 1975," the firm said, with a large portion of the growth attributable to computer systems and related input devices.

1975 Shipments at $20 Million

From a base of $6 million in related computer equipment shipped in 1971, the firm predicted there would be shipments of $20 million by 1975, while the use of related input devices would grow from shipments of $3 million in 1971 to $60 million in 1975.

Computerized phototypesetters will show a growth from 1971 shipments of $50 million to over $150 million in the same time period, Frost and Sullivan added.

But while the growth rate in the 1971-1975 period will be high, the firm noted most of the growth will be in low-cost phototypesetting units as smaller printing shops convert to the computerized methods.

In addition, it said "the most dramatic growth will be seen in the CRT-type editing terminals and in OCR input devices."

CRT input/output and OCR terminals will have sales of $35 million and $20 million respectively in 1975 from a virtually non-existent base in 1971, the firm predicted.

Newspapers Large Market

The newspaper segment of the publishing market will be the best market for computerized devices, Frost and Sullivan said, as newspapers attempt to lower costs and shorten throughput times.

"This segment," the firm said "will continue to use more of the computerized systems available (by a ratio of 2 to 1) compared to other segments of the printing industry."

Overall the "rapid growth" in the use of computerized systems will be "sparked by the technological advances created by equipment such as remote optical character readers (OCR), computer output microfilmers (COM) and computer software packages specially designed for the printing application," the firm added.

The 30% to 35% growth rate in the industry up until 1975 is expected to slow slightly over the last five years of this decade, Frost and Sullivan said, predicting a 20% to 25% growth rate for the period from 1975 to 1980 and a total yearly market of $500 million by 1980.

Market Leaders

At present, Frost and Sullivan said Photon has the market-share lead with 36% of the total installed typesetting units, followed closely by Compugraphics with a 28% share of the market. Merganthaler is in third place with 14%, followed by Harris-Intertype with 10%, and the remaining 12% is split among Fairchild, Star Parts, Dian, RCA and Alphatype.

In the COM field, the leaders in the phototypesetting business are Information International, Stromberg Datagraphix, Seaco and Singer, Frost and Sullivan said, listing the leaders on the OCR side as Compuscan, Information International, CDC, Scan Data, Datatype, and IBM.

"The need still exists for a low cost (under $100,000) CRT typesetting unit," Frost and Sullivan pointed out, noting that "such devices would command a good portion" of the market.

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Bulgaria DP Development Forges Ahead, But Production Equipment Seen Lacking

By Bohdan O. Szuprowicz
Special to Computerworld

NEW YORK – The Bulgarian state electronic industry was even ahead of the Russians in introducing the first Riad Series EC 1020 computer in late 1971, as part of its effort to satisfy expected increased needs for DP equipment during their current Five Year Plan.

Developed jointly with the Russian Ordzonikidze computer factory, it was not until January 1972 that the *Pravda* carried an article announcing the introduction of the Soviet version.

The Bulgarians have also displayed a prototype disk drive unit compatible with all Riad computers which is being developed and will be manufactured in Bulgaria.

The Bulgarian disk drive, the EC 5052, is very similar to the IBM 2311 units with almost identical characteristics, according to Todor Boyadjev, a commercial counsellor who is also an electronic engineer and frequent visitor to our Joint Computer Conferences.

Disk packs have 7.25 Mbytes capacity with six disks to a pack and 10 recording surfaces.

But to begin production the Bulgarians need a few more precision parts and are in the market for disk hubs, lockscrews fixing the disks into position and spacer rings between the disks.

Bulgaria is also interested in buying automated equipment for use in production of electronic parts and components, observed Boyadjev.

But the Bulgarians are not sure if they can buy such equipment from U.S. manufacturers. During his five-year stay here Boyadjev arranged a $1.5 million deal to buy testing equipment for disk pack production from a company in Oklahoma City but the deal fell through because the Department of Commerce denied export license for the equipment.

Izot, the Bulgarian electronics enterprise, is now operating 30 plants, 25 of which have been completed in the last five years. Besides the Riad EC 1020 computer and disk drive, the Bulgarians are also producing a home designed second generation computer, the Zit-151. Manufacture of this unit will be dropped as soon as the Riad computer is in production.

There are also plans to curtail the assembly under license of Japanese Facom 230-30 of which 20 units have been installed in Bulgaria during the last seven years.

Bulgaria is turning to several more convenient suppliers in the West including IBM, which has installed several machines. IBM is represented by a Bulgarian agency in Sofia, with as many as 50 persons selling, installing, programming and servicing its equipment.

Izot also manufactures tape drives compatible with the Riad system. It is increasingly interested in obtaining the necessary technology to produce miniperipherals such as tapes, cassette drives and disks. This area may be suitable for joint ventures and licensing agreements with Western manufacturers.

Besides the modern plant capacity, Bulgaria also claims to offer a relatively knowledgeable design capability and production personnel. Boyadjev claimed that Bulgarian engineer Lubin Antonov was first to build the prototype electronic calculator some 15 years ago.

Printer for License

One of their peripheral designs which they would like to license for manufacturing or produce on an OEM basis for the West is a high-speed printer. Its design consists of a moving roller while the printing head remains stationary.

But on the average the typical Bulgarian computer user is not very experienced and few have more than five years in data processing. The Bureau of Statistics in Sofia is regarded as the most sophisticated computer installation with French, Russian and IBM computers.

Availability of credits is very important to Bulgaria and with planned intense industrialization during the current 1971-1975 Five Year Plan the country will need a substantial number of computers.

Bulgaria will try to meet the need from local production but is ready to buy from the West if appropriate credits are made available.

Otherwise it will have to rely on Comecon countries to supply the equipment which it does not manufacture, namely larger and medium size computers as well as some peripherals.

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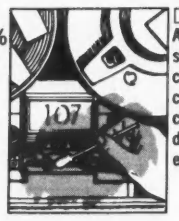

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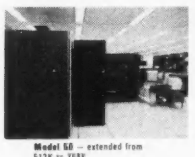
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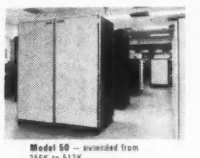
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Mainframes in '73

Navy Plans Data Entry Procurements

WASHINGTON, D.C. – Data entry, leasing and independent maintenance procurements are planned by the U.S. Navy during the current quarter (October through December).

But subsequent major Navy procurement actions for the first quarter of 1973 will involve primarily mainframe equipment, according to a forecast of future Navy procurements issued recently by the Navy's Automatic Data Processing Equipment Selection Office (Adpeso).

The Office said the Chief of Naval Operations would issue a solicitation this month calling for the replacement of keypunch and key-verify equipment with key-to-disk data entry systems at about 25 selected Navy facilities.

In a bid to be announced next month, Adpeso said the Naval Air Systems Command would seek to acquire computer output microfilm equipment for both the Pacific Missile Range, Point Mugu, Calif., and the Naval Ship Research and Development Center in Carderock, Md.

Another bid is scheduled for selected Navy activities to acquire single source maintenance for certain computer equipment in the U.S. Several observers said this contract might be a test of independent maintenance by the Navy and, if successful, could open up this field to the independent groups.

Before the end of the year, the Marine Corps plans to acquire an IBM 360/65 and a 360/50 and the bidding will be open to leasing companies.

Other bids include:

- Dynamic control system simulator (analog/digital system for the Naval Ship Research and Development Center.
- Replacement of two Control Data 3300s with a large-scale computer at the Naval Research Laboratory here.
- Medium scale computer system for the Naval Air Station in Memphis, Tenn.
- Replacement of three IBM 7094s, one 360/40 and one 360/30 with a large-scale system or systems at the Pacific Missile Range.
- Large scale computer system during the first quarter of 1973 for the Naval Facilities Engineering Command.
- An IBM 360/50.

In addition, the Navy plans a solicitation for the acquisition of multiple minicomputers to satisfy Navy-wide requirements for such systems during the first 1973 quarter.

All of the solicitations outlined in this forecast are tentative, Adpeso said, noting it was the main contact point for any information regarding the Navy's procurement plans.

Calcomp, Century Realign Staffs

ANAHEIM, Calif. – California Computer Products, Inc. announced several executive changes in a planned operations consolidation with Century Data Systems, Inc., a 94%-owned subsidiary. The move is in conjunction with a contemplated tender offer by Calcomp to acquire the remaining 6% of Century.

Executive Corner

George M. Canova, president of Century, was elected executive vice-president of Calcomp, responsible for overall operations.

James Y. Payton, executive vice-president of Century, was named senior vice-president of Calcomp and will be in charge of disk and tape drive product manufacturing and engineering, as well as marketing of memory and graphic products to original equipment manufacturers.

Charles H. Sword, a Calcomp vice-president, was named a senior vice-president in charge of consolidated administration functions at Calcomp and Century...

■ Frederick B. Schudel and Michael Harvey of Century were also named Calcomp vice-presidents.

Other Moves

■ IBM World Trade has elected three new members to its board of directors: Robert W. Hubner, IBM senior vice-president and a management committee member; Dean R. McKay, IBM senior vice-president and group executive; and Bertram H. Witham, vice-president for finance for World Trade.

■ Pertec Corp. has named five new vice-presidents: Dr. Eric Dunstan; Loren Huweiler, Al Lay, David Mayne and John North.

■ Ian H. Rutherford has been named president of Computer Sciences Canada, Ltd.

GTE Makes Centralization Move

WHITE PLAINS, N.Y. – GTE Information Systems has completed the consolidation of its operating units with a move from decentralized management of its five subsidiaries into a centralized management scheme.

Under the realignment, the former decentralized subsidiaries, Novar Corp., Tempo Computers Inc., Ultronic Systems Corp., Programming Methods Inc., and GTEIS Service Co. will all come under direct corporate control.

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Under the new arrangement, Jacques O. De Labry will be vice-president for systems and marketing for the consolidated organization; James T. Lawson will be vice-president for corporate development; J. Edward McAteer will be responsible for all manufacturing and engineering as vice-president of operations; and Robert F. McGrath will be responsible for corporate financial activities and personnel.

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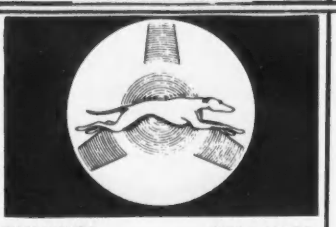

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COMPUTERWORLD

Acquisitions

Automated Data Processing Inc., a computer services firm, agreed to acquire **Computer Communications Network Inc.** for about 65,000 shares of common stock. Computer Communications provides central accounting services for distributors and hospitals.

Shareholders of **Brandon Applied Systems Inc.** have approved the merger with **Rand Teleprocessing Corp.** for an exchange of stock.

Central Data Systems Inc. has acquired **Accounting & Business Forms, Inc.** for over $1 million in cash and stock.

Computer Task Group, Inc. has acquired **Paperwork Data-Comm Services, Inc.**, a Syracuse, N.Y., computer center for an undisclosed amount of cash and stock.

Comperipherals Inc. has agreed to acquire **Lago Calc Inc.** for cash and stock. Lago Calc manufacturers electronic calculators.

Information Magnetics Corp., a magnetic disk head manufacturer, has agreed in principle to acquire **Gresham Heads Ltd.** for about $535,000 in cash and stock. Gresham manufacturers tape heads for sale in Europe.

System Development Corp. has acquired **Investment Data Corp.**, which provides proprietary computerized services to financial institutions. Investment Data will operate as a wholly owned subsidiary of SDC.

Advanced Computer Techniques Corp., a computer consulting company, has agreed in principle to acquire **Advanced Systems Associates Inc.**, a consulting and services firm.

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Despite $2.5 Million Quarter Loss

Calcomp Expects 'Modest Profit' in '73

ANAHEIM, Calif. – Hard on the heels of a $12.9 million loss for fiscal 1972, California Computer Products (Calcomp) expects to lose $2.5 million in its first 1973 quarter ended Sept. 30.

But the company still expects "a modest profit" for the year ending next June 30. "We estimate a small loss in the second quarter, a small profit in the third quarter and a significant profit in the fourth quarter," observed President Lester L. Kilpatrick.

First-quarter revenues were affected by changes-in-accounting methods which eliminate deferrals on leased equipment costs. Also, the timing of deliveries to Burroughs and Sperry Rand accounted for relatively low revenues this period, he said.

During the year, Kilpatrick expects a 30% to 40% increase in revenue as "shipments to Burroughs and Univac accelerate and as new products in both the graphic and memory areas are available," he added.

Speaking of the pricing pressure from IBM in the peripheral market, Kilpatrick asserted that Calcomp was in a better position to survive than other peripheral makers because of its sales to original-equipment manufacturers such as Burroughs and Univac.

"The margins in the IBM end-use market have been cut down so much that you can't succeed in that area alone unless your costs of production are reduced by a large base in production for original equipment manufacturers," he said. About 31% of Calcomp's volume last year was from OEM sales, and these will increase about 50% in fiscal 1973, Kilpatrick said.

End-user sales and leases, responsible for 27% of last year's volume, will rise to 40% this year, he added.

Sanders Sees Commercial Division Expanding at 20% Annual Rate

By Ronald A. Frank
Of the CW Staff

NASHUA, N.H. – Sanders Data Systems helped to put its parent, Sanders Associates, back in the profit column during the fourth quarter of fiscal 1972, and current projections call for more than a 20% annual growth rate for the Sanders commercial operations.

This was the message presented to stockholders at the 21st annual meeting by President Royden C. Sanders Jr.

Stating that the firm's entry into the terminal market had finally begun to pay off, Sanders predicted that within five years 50% of the company's revenues will be generated by the commercial Data Systems Division. To achieve this goal, the division will have to greatly surpass its current annual growth rate, he admitted.

Sanders has installed 500 of its Can Do systems, according to Al White, vice-president and general manager of the Data Systems Division. About 50% of these systems have been leased, he said.

Leased systems are essentially "delayed profits," Sanders noted. But they are more profitable in the long run than outright sales, he added.

The intelligent terminal market has had none of the intense pressure from IBM that the plug-compatible vendors have felt, White said.

The new IBM 3270 CRT system has increased the product life and demand for the Sanders 620 and 720 display systems, Sanders said.

The Data Systems Division will continue on a profitable basis with higher quarterly earnings during each period, and Sanders Associates will also continue its growth pattern, company officials predicted.

Quarter Improvement Expected by STC

BOULDER, Colo. – Storage Technology Corp. is expecting its third consecutive quarter of improved results, for the period ended Sept. 29, with operating earnings of about $738,000, or 21 cents a share. In the 1971 period, the firm lost $766,000.

Including a special tax-loss credit of $462,000, or 14 cents a share, the quarter's earnings will rise to $1.2 million, or 35 cents a share.

President Jesse Aweida said he was optimistic the upward trend will continue into the fourth quarter and beyond for the tape drive maker.

Storage Technology is progressing "very close to plan," he said, although "outright sales and customer conversions to purchase have run ahead of plan thus far . . . while rental revenue has lagged somewhat primarily due to not being able to increase the production rate as fast as hoped for.

"Monthly production, has, however, more than doubled since January of this year," he observed.

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Computerworld Stock Trading Summary

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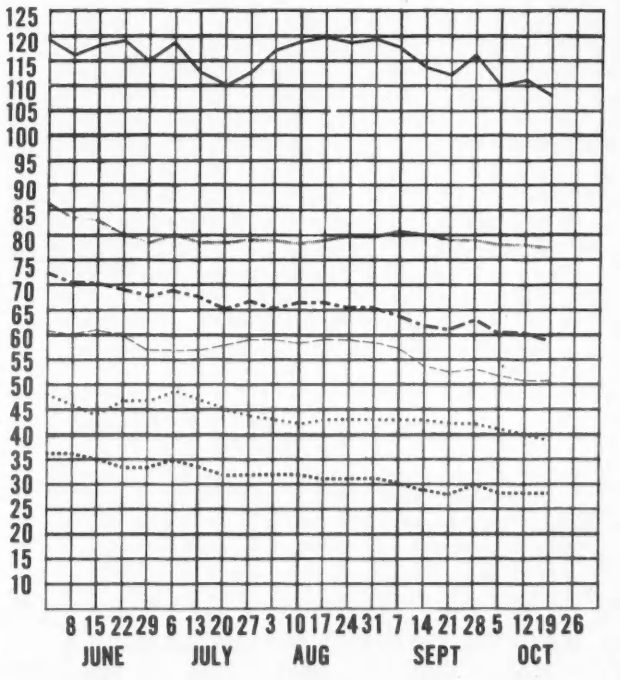
CLOSING PRICES THURSDAY, OCTOBER 19, 1972

EXCH		1972 RANGE (1)	CLOSE OCT 19 1972	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 3	2 1/8	0	0.0
A	APPLIED DATA RES.	4- 7	3 7/8	- 1/8	-3.1
O	APPLIED LOGIC	1- 4	2 5/8	+ 1/8	+5.0
N	AUTOMATIC DATA PROC	72- 99	90 1/4	+1 5/8	+1.8
O	BRANDON APPLIED SYST	1- 2	7/8	0	0.0
O	COMPUTER DIMENSIONS	6- 14	6 3/8	- 1/8	-1.9
O	COMPUTER DYNAMICS	1- 4	7/8	0	0.0
O	COMPUTER NETWORK	3- 7	3 1/4	0	0.0
N	COMPUTER SCIENCES	4- 10	4 5/8	- 1/2	-0.7
O	COMPUTER TASK GROUP	1- 2	1	0	0.0
O	COMPUTER TECHNOLOGY	4- 8	4	0	0.0
O	COMPUTER USAGE	7- 14	9 1/4	- 1/2	-5.1
O	COMP AUTOMOT REPORTS	5- 9	6 1/2	0	0.0
N	COMPUTING & SOFTWARE	14- 28	14 3/8	- 5/8	-4.1
O	COMRESS	1- 3	1	- 1/4	-20.0
O	COMSHARE	5- 10	7 1/4	+ 7/8	+13.7
O	DATATAB	5- 9	4 1/2	- 1/8	-2.7
O	EDP RESOURCES	3- 8	2 3/4	0	0.0
A	ELECT COMP PROG	2- 5	1 1/2	0	0.0
N	ELECTRONIC DATA SYS.	43- 65	53 1/4	-1 5/8	-2.9
O	INFORMATICS	5- 11	5 1/2	+ 1/8	+2.3
O	I.O.A. DATA CORP	1- 3	1 1/8	- 1/4	-18.1
O	KEANE ASSOCIATES	4- 7	4	+ 1/4	+6.6
O	KEYDATA CORP	7- 13	12 1/4	-1	-7.5
O	LOGICON	4- 9	6 1/8	- 1/2	-7.5
A	MANAGEMENT DATA	4- 10	4	- 1/2	-11.1
O	NATIONAL CSS INC	8- 28	26 1/2	- 1/8	-0.4
O	NATIONAL INFO SRVCS	2- 5	1 1/2	- 1/8	-7.6
P	ON LINE SYSTEMS INC	8- 20	23	+ 1/2	+2.2
N	PLANNING RESEARCH	7- 17	6 7/8	- 1/8	-1.7
O	PROGRAMMING METHODS	20- 24	21 1/2	0	0.0
O	PROGRAMMING & SYS	1- 2	1 1/4	+ 1/8	+11.1
O	RAPIDATA INC	5- 25	21	+ 3/4	+3.7
O	SCIENTIFIC COMPUTERS	2- 4	1 7/8	+ 1/8	+7.1
O	SIMPLICITY COMPUTER	1- 5	3 3/8	- 3/4	-18.1
O	TBS COMPUTER CENTERS	3- 6	3 1/4	0	0.0
O	TCC INC	1- 3	1 1/8	0	0.0
O	TYMSHARE INC	7- 11	7 5/8	0	0.0
O	UNITED DATA CENTER	5- 8	6 1/4	+ 1/4	+4.1
N	UNIVERSITY COMPUTING	13- 26	12 3/4	- 1/4	-1.9
A	URS SYSTEMS	6- 10	7 7/8	0	0.0
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	34- 49	38 1/8	+ 1/8	+0.3
O	ADVANCED MEMORY SYS	12- 23	16 3/4	+2 3/4	+19.6
N	AMPEX CORP	5- 15	5 1/4	+ 1/8	+2.4
O	ANDERSON JACOBSON	5- 8	3 5/8	- 1/8	-3.3
O	ATLANTIC TECHNOLOGY	1- 11	3/8	0	0.0
O	BEEHIVE MEDICAL ELEC	1- 5	4 3/4	0	0.0
A	BOLT,BERANEK & NEW	5- 21	13 3/8	-1 1/2	-10.0
N	BUNKER-RAMO	9- 14	9 5/8	- 3/8	-3.7
A	CALCOMP	10- 25	10 1/2	+ 1/4	+2.4
O	CAMBRIDGE MEMORIES	9- 15	9	- 3/4	-7.6
O	CENTRONICS DATA COMP	11- 53	40	+5 1/2	+15.9
O	COGNITRONICS	2- 5	2 5/8	- 3/8	-12.5
O	COMPUTER COMMUN.	1- 7	3 1/8	+ 5/8	+25.0
A	COMPUTER EQUIPMENT	3- 4	2 3/4	0	0.0
O	COMPUTER MACHINERY	7- 13	8 1/8	- 3/8	-4.4
A	COMPUTEST	3- 9	3 3/4	0	0.0
A	DATA PRODUCTS CORP	3- 7	3 3/4	+ 1/4	+7.1
O	DATA RECOGNITION	1- 5	1 1/4	0	0.0
O	DATA TECHNOLOGY	2- 5	2 3/4	0	0.0
O	DI/AN CONTROLS	0- 8	4 1/2	+ 1/8	+2.8
N	ELECTRONIC M & M	3- 8	3 3/8	- 1/8	-3.5
O	FABRI-TEK	2- 5	3 3/8	- 3/8	-10.0
O	GENERAL COMPUTER SYS	7- 16	7 3/4	-1 1/2	-16.2
N	GENERAL ELECTRIC	59- 70	61 7/8	-1 3/8	-2.1
N	HAZELTINE CORP	7- 13	8 1/8	+ 3/4	+10.1
O	INFOREX INC	20- 36	21	0	0.0
O	INFORMATION DISPLAYS	1- 5	1 5/8	+ 1/8	+8.3
A	LUNDY ELECTRONICS	9- 14	9 1/8	0	0.0
O	MANAGEMENT ASSIST	1- 2	3/8	0	0.0
N	MEMOREX	16- 38	20 1/2	- 3/8	-1.7
A	MILGO ELECTRONICS	17- 44	16 7/8	-5 1/8	-23.2
N	MOHAWK DATA SCI	14- 27	15	+ 1/2	+3.4
O	OPTICAL SCANNING	6- 16	6 1/2	- 3/4	-10.3
O	PERTEC CORP	8- 17	10 1/4	-1 1/4	-10.8
O	PHOTON	6- 15	8 1/2	+1 1/4	+17.2
A	POTTER INSTRUMENT	7- 21	7 3/4	+ 5/8	+8.7
O	PRECISION INST.	4- 13	5	+ 1/2	+11.1
O	RECOGNITION EQUIP	5- 15	5 1/2	- 5/8	-10.2
N	SANDERS ASSOCIATES	13- 21	13 3/4	- 3/4	-5.1
O	SCAN DATA	5- 13	4 5/8	-1 3/4	-27.4
O	STORAGE TECHNOLOGY	17- 39	28 3/4	- 3/4	-2.5
O	SYCOR INC	7- 11	9	0	0.0
O	TALLY CORP.	8- 15	10	- 1/8	-1.2
N	TEKTRONIX INC	34- 64	50 5/8	- 3/8	-0.7
N	TELEX	6- 15	6 7/8	0	0.0
O	WILTEK INC	10- 26	16	- 3/4	-4.4
	SUPPLIES & ACCESSORIES				
O	BALTIMORE BUS FORMS	6- 9	7	0	0.0
A	BARRY WRIGHT	9- 14	10 7/8	- 5/8	-5.4
A	DATA DOCUMENTS	17- 26	20	+ 1/4	+1.2
O	DUPLEX PRODUCTS INC	8- 16	8	0	0.0
N	ENNIS BUS. FORMS	6- 10	5 7/8	- 1/2	-7.8
O	GRAHAM MAGNETICS	15- 27	16 1/2	- 5/8	-3.6
O	GRAPHIC CONTROLS	12- 15	13 3/8	+ 5/8	+4.9
N	3M COMPANY	76- 85	76 5/8	-1 1/8	-1.4
O	MOORE CORP LTD	42- 56	52 7/8	-1 5/8	-2.9
N	NASHUA CORP	48- 62	57 1/8	+ 1/8	+0.2
O	REYNOLDS & REYNOLD	37- 77	44 1/4	-1	-2.2
O	STANDARD REGISTER	14- 20	16 1/4	+ 1/4	+1.5
O	TAB PRODUCTS CO	14- 23	20	- 1/2	-2.4
N	UARCO	21- 28	21 3/8	- 1/2	-2.2
A	WABASH MAGNETICS	7- 11	6 1/2	- 1/4	-3.7
N	WALLACE BUS FORMS	21- 26	21	- 3/4	-3.4
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	147-226	213 1/2	+2 1/2	+1.1
N	COLLINS RADIO	14- 20	14 3/4	0	0.0
N	CONTROL DATA CORP	43- 78	63 1/4	-2 1/4	-3.4
O	DATA GENERAL CORP	56-115	108 1/2	-1	-0.9
O	DIGITAL COMP CONTROL	9- 25	8	- 3/4	-8.5
N	DIGITAL EQUIPMENT	72-101	97 1/4	0	0.0
N	ELECTRONIC ASSOC.	6- 13	8 1/2	- 1/8	-1.4
A	ELECTRONIC ENGINEER.	6- 14	8 1/8	+ 3/8	+4.8
N	FOXBORO	25- 41	25	-1 1/8	-4.3
O	GENERAL AUTOMATION	13- 38	31 1/4	0	0.0
O	GRI COMPUTER CORP	3- 5	3 1/8	- 1/8	-3.8
N	HEWLETT-PACKARD CO	46- 77	67 5/8	-3 7/8	-5.4
N	HONEYWELL INC	122-170	134	+3 1/2	+2.6
N	IBM	333-426	378 1/2	-6	-1.5
O	INTERDATA INC	8- 16	11 5/8	- 3/4	-6.0
O	MICRODATA CORP	5- 10	7 1/2	-1	-11.7
N	NCR	29- 38	33 1/8	-2 7/8	-7.9
N	RAYTHEON CO	27- 47	27 5/8	- 3/8	-1.3
N	SPERRY RAND	30- 48	45 7/8	+ 1/2	+1.1
A	SYSTEMS ENG. LABS	9- 16	9	- 1/8	-1.3
N	VARIAN ASSOCIATES	14- 22	19 1/8	-1 1/8	-5.5
N	VICTOR COMPTOMETER	15- 24	16 3/8	- 5/8	-3.6
N	WANG LABS.	23- 61	24 1/2	-1 1/2	-5.7
N	XEROX CORP	121-172	152	- 5/8	-0.4
	LEASING COMPANIES				
A	BOOTHE COMPUTER	4- 18	4 1/4	+ 3/8	+9.6
O	BRESNAHAN CORP.	2- 3	1 3/4	0	0.0
O	COMDISCO INC	3- 18	15 1/2	- 5/8	-3.8
O	COMMERCE GROUP CORP	5- 11	6 3/8	0	0.0
O	COMPUTER EXCHANGE	1- 3	7/8	- 1/8	-12.5
A	COMPUTER INVSTRS GRP	7- 14	7 1/2	- 1/2	-6.2
N	DPF INC	5- 13	5 1/2	+ 1/2	+10.0
M	DATRONIC RENTAL	2- 4	1 7/8	0	0.0
A	DCL INC	4- 10	3 3/4	0	0.0
A	DEARBORN-STORM	16- 26	18 1/4	-1 3/8	-7.0
A	DPA, INC.	5- 8	6 3/8	0	0.0
A	GRANITE MGT	5- 11	6 1/8	0	0.0
A	GREYHOUND COMPUTER	6- 11	6 1/4	0	0.0
A	ITEL	7- 12	9 3/8	- 1/2	-5.0
N	LEASCO CORP	17- 24	17 3/8	- 3/8	-2.1
O	LEASPAC CORP	6- 15	6 3/4	+ 3/4	+12.5
O	LECTRO MGT INC	1- 4	1 3/4	- 1/4	-12.5
A	ROCKWOOD COMPUTER	2- 7	2 1/4	0	0.0
O	SYSTEMS CAPITAL	3- 20	11 7/8	-1 1/8	-8.6
N	U.S. LEASING	19- 33	25	-2 1/4	-8.2

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
P=PHIL-BALT-WASH
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index



Earnings Reports

DATA DIMENSIONS
Six Months Ended June 30

	1972	a1971
Shr Ernd	$.04	$(.10)
Revenue	1,068,932	945,272
Earnings	27,525	(81,893)

a-Restated to reflect acquisitions on a pooling-of-interests basis.

FOXBORO
Three Months Ended June 30

	1972	1971
Shr Ernd	$.16	$.43
Revenue	37,727,000	40,913,000
Earnings	697,000	1,940,000
6 Mo Shr	.42	.79
Revenue	76,543,000	78,967,000
Earnings	1,891,000	3,443,000

SCIENTIFIC COMPUTERS
Year Ended June 30

	1972	1971
Shr Ernd	$.21	$.16
Revenue	3,684,722	3,526,646
Earnings	172,516	128,792

SYSTEMS ENGINEERING LABORATORIES
Year Ended June 30

	1972	a1971
Shr Ernd	$.43	.....
Revenue	15,719,000	$12,773,000
Spec Item	b308,000	d3,464,000
Earnings	1,112,000	(12,443,000)

a-Restated to reflect a prior period charge for a federal income tax settlement of $520,000. b-Credit; includes a $398,000 tax credit less a $90,000 loss on liquidation of subsidiary. d-Debit; loss from sale of subsidiary.

AMPEX
Three Months Ended July 29

	1972	a1971
Revenue	$68,809,000	.....
Loss	3,155,000	.....

a-Comparative figures not available.

LOGIC
Six Months Ended June 30

	1972	1971
Shr Ernd	$.01	$.10
Revenue	1,550,720	1,807,922
Tax Cred	26,000	115,000
Earnings	42,095	233,638

AUTOMATIC DATA PROCESSING
Year Ended June 30

	1972	1971
Shr Ernd	$1.14	$.87
Revenue	62,141,414	49,043,543
Earnings	6,470,113	4,807,083

CORPORATION S
Three Months Ended July 31

	1972	1971
Revenue	$438,000	$382,000
aSpec Chg	205,000	2,369,000
Loss	669,000	2,861,000
9 Mo Rev	1,275,000	990,000
aSpec Chg	366,000	3,103,000
Loss	1,845,000	4,725,000

a-Loss from joint venture operations in both years and equipment write-offs in 1971.

PUNCH CARDS
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Shasta Beverages, a Consolidated Foods Company, is on the move — with a nationwide network of nineteen modern, high-speed soft drink plants, producing and distributing thirteen different flavors of beverages. Shasta uses the Hazeltine 2000 CRT terminal system, Price/Performance leader in its class of computer peripheral equipment.

Shipping, production and payroll data is prepared off-line at the plant sites. Using the powerful formatting capability of the terminal, the data is displayed and verified on the video screen and then stored on the "dual" Tape Cassette Unit. At the end of the day, the data is transmitted to the Shasta computer center in California for overnight processing and *day-after-shipment* invoicing!

The Soft Drink Industry — another of the rapidly-increasing number of businesses where the Hazeltine 2000 is showing the way to impressive profit-building, cost-cutting applications.

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Hazeltine Corporation

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